AGRICULTURAL

Chemicals

THE YELLS WEST

Khap a sector Militar for

America . . . A Red Horbids

Apple Powdery Allians

Cress Loague Federation

3 tom/ecre Superphosphak

Heatach or la Argentin

1956 Fingleide Tests

WAY, 1957

THE CASE

OF THE KILLER UNSEEN KILLER

Verdict:

Guilty of damaging —
Cotton (damping-off)
Crucifers (club root and black root)
Lettuce (leaf drop and bottom rot)
Green Beans (root and stem rot)
Potatoes (scab and damping-off)
Alfalfa and Clover (crown rot)
Wheat seed (common smut or bunt)
Ornamentals (crown rot, black rot, stem rot, and flower blight)

Sentence:

To be subjected to, and hence controlled by, TERRACLOR—Olin Mathieson's new fungicide for certain soil-borne diseases. Available as 10%, 20%, and 40% dust ... 75% wettable powder ... 2 lb. emulsifiable. Possesses a long residual action—one application is often effective from planting time to crop maturity. Write for descriptive literature.

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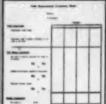
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The Atlas Guide

Emulsifier

Selection







1. Atlas Guide to Insecticide and Emulsifier Selection shows you how to formulate with the new ATLOX 4500 and 4600 emulsifiers.* Charts and lab reports tell you what one emulsifier will work in all your formulas, or which one will give peak performance in each formula. It shows how to adjust for mixed solvents, for changes in solvents, for water hardness, for toxicant changes.

Because the Guide is useful only to volume formulators of chlorinated hydrocarbon insecticides for agricultural use, it will be presented personally by an Atlas representative to those who request it on their company letterhead.

- 2. Field Evaluation Charts give the chemist a guide and check list of field use conditions and desired performance. Available in pads.
- Suggested Test Methods developed by Atlas help make formulation easier, less tedious, faster and more accurate. A movie, "Pesticidal Emulsion Testing," a booklet and reprints of technical articles are available.
- 4. Formulation Service by the Atlas laboratories, among the largest and best equipped in the industry, gives you valuable help on special problems.



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Brantford, Ontorio, Canada



Chemicals



This Month's Cover

From the new American Cyanamid movie "Prelude to Plenty," a still showing the spraying of citrus for red scale in California. The techni-color film has just been released for distribution to county agents, garden and other clubs, extension specialists, etc.

> Publisher Wayne E. Dorland Editor **Eleonore Kanar** Associate Editor Richard McNally Advertising Manager Ralph Dorland Eastern District Manager Roger Appleby

Midwestern Manager Robert F. Garty

> Circulation **David Tryon**

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Vol. 12, No. 5

May, 1957

AGRICULTURAL Chemicals

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cattlemen and plant sanitarians have long been demanding a safe repellent that actually repels insects... and keeps repelling. TABUTREX meets this tremendous demand! Now, at last, dairy cattle and other farm animals can be safely protected from loss in weight and decreased milk production because of the discomfort of biting flies.

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See for yourself how TABUTREX works! Flies veer away from it as if they had struck an invisible curtain. Roaches refuse to rest on it. Yet it has no unpleasant odor.

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Pushing barge shipments of Triple Super up the Mississippi has meant immediate savings at our inland plants, says Ralph Fraser of the Summers Fertilizer Company



"Our plant men are always glad to see International's Triple come in," says Ass't Plant Superintendent Frank Prenger.



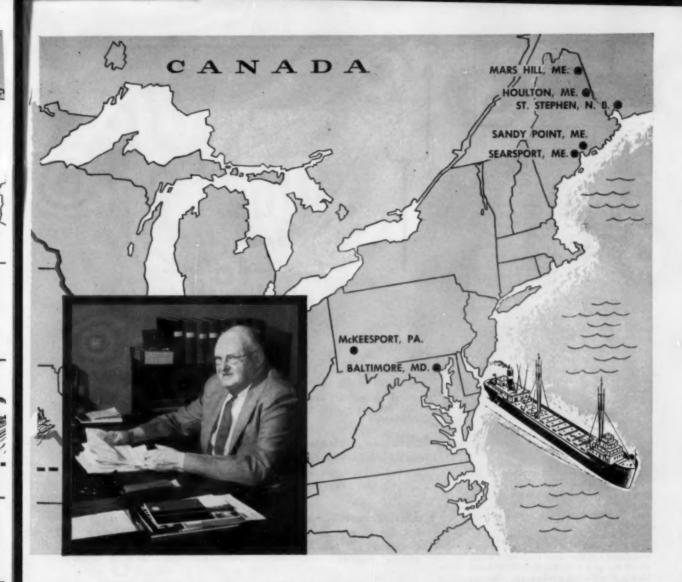
Mixed goods manufactured in the Summers plants are sold in 15 north-ern states under the well-known brand name, "Best-On-Earth".



International's natural-curing for a minimum of 5 weeks contributes to excellent physical condition that holds down handling problems.



Prenger checks a new shipment of In-ternational Triple. Uniform particle size . . . desirable moisture content mean good ammoniation.



"From the Dakotas to Maine, our 9 fertilizer plants meet a lot of different conditions." says Ralph Fraser, vice-president of the Summers Fertilizer Company.

"But one thing sure — in every plant where we use triple super, International's water-routing saves us money."

"That's one of the reasons we welcomed their barge shipments up the Mississippi River. It meant immediate savings at our plants in Grand Forks, N. Dak., and Sioux Falls, S. Dak.," adds Fraser.

"Our East Coast plants, too, rely on International's dependable service, speedy delivery and low shipping costs."

What's more, experience has proved International's Triple arrives in good condition, whether it is shipped by barge or by rail. "The men in the plant like to handle International's Triple," says Frank Prenger, assistant superintendent of the Baltimore plant. "We think it has the proper moisture content... the desirable physical condition that gives us good ammoniation results."

The Summers Fertilizer Company dates back to 1922 when the Baltimore plant was established. Now the organization includes 9 fertilizer plants and 3 related plants serving a 15-state area.

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& CHEMICAL CORPORATION

... 20 N. WACKER DRIVE, CHICAGO 6



Sawdust Fertilizer:

A lumberman farmer of Dinuba, California, reports that he is successfully composting sawdust and wood shavings. His method is to soak these materials in aqua ammonia and ammonium sulfate and then allow microbial action to decompose them, resulting in so-called humus. Would you give me some thoughts on the practice and whether the compost may have particular value as fertilizer in growing raw jute.

BURLAP COUNCIL, INDIA JUTE MILLS W. A. Nugent New York

The art of composting woody substances is not new, although the procedure outlined does introduce some modifications in the general method.

Our information on how the jute crop in India is fertilized is very meager. From a general knowledge of the value and behavior of composted sawdust and wood chips in the United States our answer is that the compost would serve as a soil amendment but not as a complete fertilizer. Farmers in the U. S. use sawdust and shavings or wood chips generally for bedding down in the cow barn or poultry house. When mixed with manure the cellulosic materials contribute some plant nutrients, but the total mass is overbalanced in favor of nitrogen. The process described also emphasizes nitrogen which is utilized first by the bacteria and then bequeathed by them to the compost as they die.

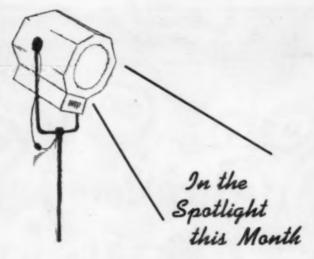
The compost should receive supplemental amounts of phosphate and potash to balance out the plant food ratio which should be on a 1-1-1 (N-P₂O₂-K₂O) basis. Hence, the treated sawdust and shavings material should be analyzed for its nitrogen, phosphoric acid and potash contents. To use it successfully for jute culture, it is suggested that the inquirer find out what is the current manurial or fertilizer practice in India for raising jute. Such information, plus a soil test, would enable the local agronomist to judge the value of the composted woody material and to determine the supplemental amounts of fertilizer materials needed for the crop goals.

V. Sauchelö

Australia rep?

We are importers and manufacturers in Australia of products used in crop protection, including agricultural insecticides, fungicides, herbicides, etc. To increase our range of products we are interested in representing American companies in Australia for the sale of their products, perhaps manufacturing for them in Australia, or if this is not possible, then in the importation of such products.

The writer will visit the United States in September of this year. During this (Continued on Page 123)



- Fertilizer Prices . . . The fertilizer blender who confines his market to a small radius, utilizes low-cost facilities, and has only a meager capital investment, can and does undersell the old-line established competitor. Page 48.
- Eradication of Khapra Beetle . . . Early detection of infestation, methyl bromide fumigation at 3 to 4 pounds per 1,000 cubic feet . . . a successful program in complete éradication of this damaging storage crop pest. Page 32.
- Mildew Control . . . Use of Systox plus lead arsenate in the petal fall
 and first cover sprays checked mildew on apples better than other
 fungicides, and caused less injury than did sulfur, Karathane or
 Mildex. Page 41.
- A Sulfur Deficiency? . . . Ordinary superphosphate contains a high
 percentage of sulfur as calcium sulfate. The increasing use of triple
 superphosphate in the manufacture of the higher analysis mixed fertilizers may pose a problem, since triple super does not carry sulfur
 in its makeup. Page 48.
- Heptachlor on Grosshoppers . . . The Argentine Ministry of Agriculture turns to Heptachlor to save 15,000,000 crop acres infested with grasshoppers. Page 37.
- A New Herbicide . . . Simazin, containing, 2-chloro-4,6-bis (diethylamino)-s-triazine, appears outstanding as a pre-emergence application for weed control in corn. Page 34.
- The Cost of Fertilizer... The initial cost of fertilizer is to be considered a capital investment and the extra yields of crops resulting from its application are the interest derived. Page 39.

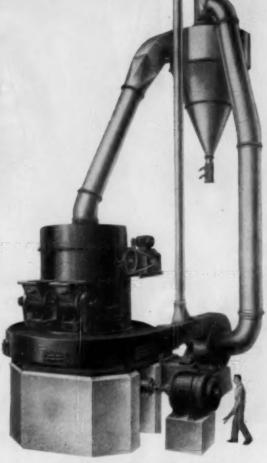
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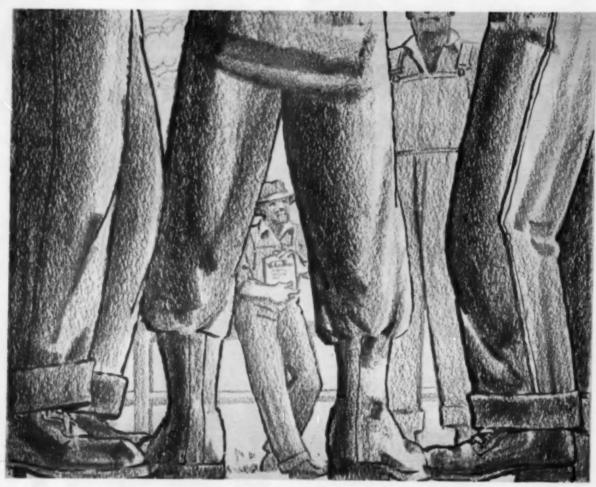
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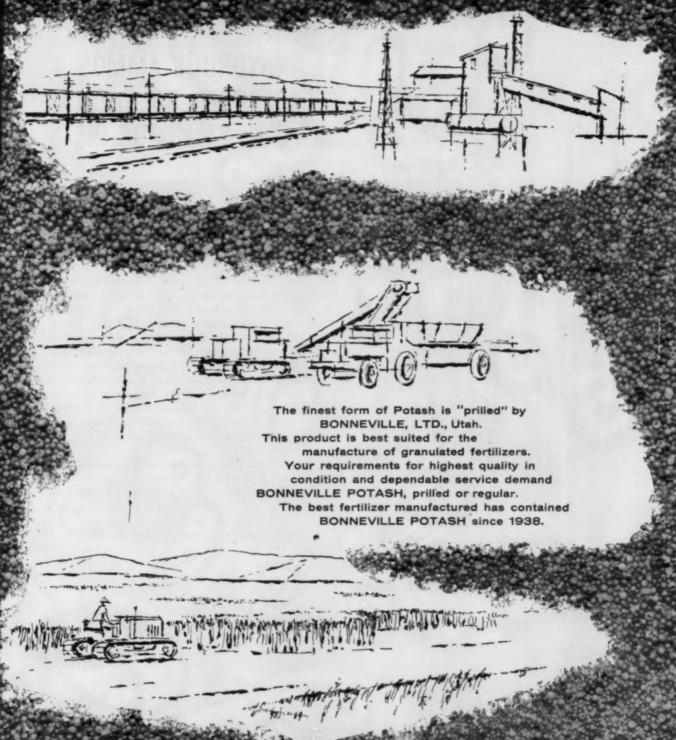
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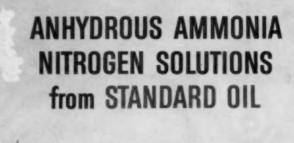


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for STABLE FLIES HORN FLIES TABANIDS on conto

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HOUSEHOLD ANTS

TABUTKEX represents an entirely new concept in insect control, depending purely on repellent action alone to rid livestock or living areas of anwanted pests.

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Contact us today for further information on Triangle Brand Copper Sulfate and its use in your agricultural chemical formulations.



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Simazin 50W, a triazine compound, is not a contact or foliage herbicide, but acts on the plant roots, and should be applied just before germination or emergence for best results. Before using Simazin 50W for long residual weed control, existing plant growth should first be removed by use of a contact herbicide, or by mowing or ploughing under.

Long-Residual, Economical

One pre-emergence application of Simazin 50W applied at the rate of 10 lbs. per acre controls most grassy and broadleaf weeds for about a year. The material is economical and easy to use. At the maximum rate of application, less than ½ lb. is required to treat 1,000 sq. ft.

Controls a Variety of Weeds

Simazin 50W controls a wide variety of grasses and broadleaf weeds including barnyard grass, witch grass, yellow foxtail, wild oats, crabgrass, broadleaf plantain, dandelion, lamb's quarters, pigweed, ragweed, nightshade, purslane, velvetleaf and mustard.

Low Toxicity, Non-Corresive

Simazin 50W has very low toxicity to humans and domestic animals. It is non-corrosive and can be removed from spraying equipment by merely flushing thoroughly with water.

No Lateral Leaching

Since there is practically no lateral leaching, Simazin 50W can be used adjacent to crop land and ornamental areas. Lack of phytotoxicity to foliage minimizes drift hazard.

Availability

Geigy Simazin 50W, containing 50% active ingredient is available in cases of 10×5 lb. bags and 50 lb. fiber drums.

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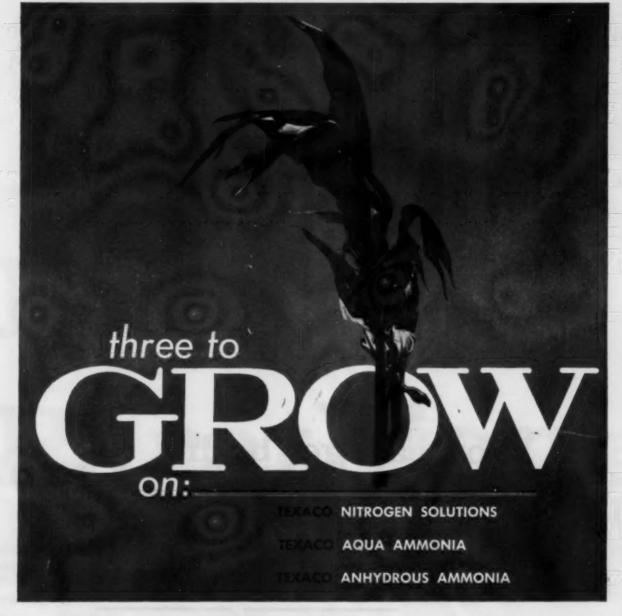
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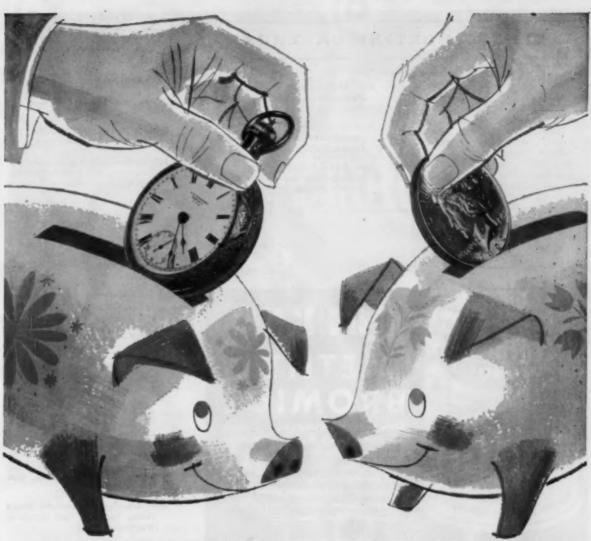
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INDUSTRY MEETING CALENDAR

- April 29-May 3—Materials Handling Exposition, Convention Hall, Philadelphia.
- May 13-15 Carolinas-Virginia Pesticide Formulators Association, Cavalier Hotel, Virginia Beach, Virginia.
- May 17-18 School for Chemical Analysts in Industry, Purdue University, Lafayette, Ind.
- May 20-22 Chemical Specialties Manufacturers Association, Drake Hotel, Chicage
- May 23 Central California Agricultural Forum, Bruce's Lodge, Fresno, Calif.
- June 9-12 National Plant Food Institute, The Greenbrier, White Sulphur Springs, W. Virginia

- June 17-19 Association of Southern Feed and Fertilizer Control Officials, 15th annual convention, Dinkler-Tutwiler Hotel, Birmingham, Alabama.
- June 25-28 American Society of Agricultural Engineers, Michigan State University, East Lansing, Mich.
- June 26-28 Pacific Branch, ESA. Multnomah Hotel, Portland, Ore.
- July 17-18—Southwestern Fertilizer Conference and Grade Hearing. Galvez Hotel, Galveston, Texas.
- Aug. 13-14 Ohio Pesticide Institute, Ohio Agricultural Experiment Station, Wooster, O.
- Sept. 8-15 International Congress of Crop Protection, fourth international meeting. Hamburg, Germany.
- Oct. 2-4—Beltwide Cotton Mechanization Conference. Shreveport, La.
- Oct. 3-5 Pacific Northwest Plant Food Assn., Sun Valley, Idaho.
- Oct. 17 Conference on Chemical Control Procedures, Shoreham Hotel, Washington, D. C.
- Oct. 29-31 Entomological Society of Canada, and Entomological Society of Alberta. Lethbridge, Alta., Canada.
- Nov. 3-5—California Fertilizer Association, St. Francis Hotel, San Francisco, Calif.
- Nov. 6-8—Fertilizer Industry Round Table, Sheraton Park Hotel, at Washington, D. C.
- Dec. 2-5—Entomological Society of America. National meeting jointly with cotton states ESA. Hotel Peabody, Memphis, Tenn.
- Dec. 9-12 Chemical Specialties Manufacturers Association, Hollywood Beach Hotel, Hollywood, Fla.
- Dec. 9-12—Vegetable Growers Association of America. Jung Hotel, New Orleans.
- Dec. 11-13—Agricultural Ammonia Institute, Hotel Marion, Little Rock, Ark.
- Dec. 12-13—Cotton Insect Control Conference, Peabody Hotel, Memphis, Tenn.
- (an. 13-15—1958 Weed Society of America and Southern Weed Conference, Peabody Hotel, Memphis, Tenn.
- Jan. 21-23 1958 California Weed Conference, San Jose, Calif.

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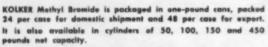
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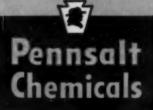
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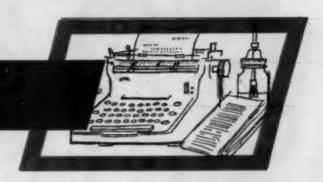
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EDITORIALS



ONGRESSMEN perennially concern themselves with grinding out new, unnecessary, pointless and unforceable laws. There are still those who feel that a new law is the answer to everything that ails us.

Latest in the batch of proposed new measures which has just been dumped into the legislative hopper is S-11, a bill to amend the Robinson-Patman Act, and which in effect would severely restrict the right of a manufacturer to meet competitive prices unless he were willing to put into effect a general reduction on all his sales of that same commodity.

John D. Conner, general counsel for the National Plant Food Institute, testified last month before a Senate Committee, presenting a strong case in opposition to enactment of such a measure, and emphasizing that there is no need nor justification for Congress to deprive a seller of the "vital right to meet competition or to so severely restrict it that it loses its significance." And, incidentally, he makes a very strong case for the fertilizer industry, pointing out that "there has never been a proceeding in the fertilizer industry based upon a violation of the Robinson-Patman Act.

He adds, too, that the farmer has been the beneficiary of the present atmosphere of vigorous competition under which fertilizer (and we might add agricultural pesticides too) are sold. The price of fertilizer has advanced less than has the price of any other commodity bought by the farmer. Fertilizer prices are now only approximately fifty percent higher than they were in the period, 1909 to 1914, while other commodities purchased by the

farmer have advanced to almost three times what they sold for in this base period.

We might add a few thoughts of our own. It's high time our legislators stop thinking up new, more complicated, pointless and impractical laws. If our present myriad laws were enforced rigidly, we would all spend one hundred percent of our time in the courts; and if they are not to be enforced, what is the point of having them? Our competitive system has made us the strongest nation in the world, and what we need is more, rather than less competition, to keep us fit and able to defend ourselves in a hostile world.

Finally, if our Senators and Representatives would put the same effort and energy into reducing excessive government expenditures that so many of them put into thinking up pointless legislation to carry their names, and to impress little groups of voters, we would all be much better off. That way we might some day be able to look forward to a reduced tax burden, which would do more than any other single factor to keep us strong.

T is still a little too early, of course, to be getting prematurely enthusiastic about the course the sales curve for agricultural chemicals will take in the 1957 season. In general, however, the outlook is good. There seems to be somewhat heavier than the usual seasonal pickup in the movement of fertilizer and fertilizer raw materials. Some price advances have occurred, and these have had their effect in stimulating early season shipments.

(Continued on Page 106)



Left: Large grain warehouse covered in preparation for fumigation with methyl bromide. Khapra Beetle

by D. R. Shepherd. USDA

In the two years of concerted eradication effort by the State and Federal Governments, the Republic of Mexico, and the grain, feed, and seed industries, the khapra beetle has been eradicated on 416 of the 471 sites where it has been found in Arizona, California, New Mexico, and the Republic of Mexico. Surveys in 40 other states have failed to reveal infestations, although more than 42,000 sites most likely to have the beetle have been inspected.

The khapra beetle is native to India, Ceylon, and Malaya, and it has been established in parts of Europe, Africa, and the Orient. It was first discovered in California in 1933, and subsequently was found in Arizona, New Mexico, and the Republic of Mexico. In the brief time that it has been known in the two countries, its importance to the national agricultural economy of each has become fully recognized. This pest thrives under a wide range of temperature. It is a voracious feeder on stored foods and feed, and under optimum conditions, populations build up in almost an explosive manner. Its habit of secreting itself in cracks and crevices of storage facilities, the ability of the larvae to resist starvation for long periods of time, and its

resistance to normal sanitation measures make it a formidable pest of the grain and seed industries.

That much was known about the khapra beetle when it was first found in California. With that background of information, state and federal pest control officials and officials of interested industries, realizing the potential for damage should it become widely established in this country, decided to seek its eradication. Upon its discovery in Mexico, officials of that country and their grain and related industries adopted eradication as an objective.

The khapra beetle does not spread far under its own power. Infestations often are confined to a small part of the storage structure, and in the initial phase of the infestation often only one of a series of buildings in common use on a site is infested. The beetle, however, is spread readily by man. We have observed that the khapra beetle will feed on practically anything of animal or plant origin, and that it will crawl onto or into anything with which it comes in contact. It thus becomes an accomplished hitchhiker, and almost any commodity or object becomes capable of accelerating its spread.

During the two years of USDA experience with this insect, we have again learned the importance of early detection of new pests to preclude spread and solid establishment. With the khapra beetle infestation in its incipiency, it has been possible to trace many of the infestations back to the original source. The pattern of spread through movement of grain and feed, packaged and sacked commodities, empty bags and other containers has been very clear. Had the beetle been identified when it supposedly was observed for the first time at Fresno, California, in 1946, eradication would have been much simpler.

Inspection for the khapra beetle is a slow and tedious operation. Very painstaking work is required to find light infestations, and thorough work to determine all of the places on a site where the beetles might be. An innocent-looking burlap bag or cardboard carton lying on the ground, a discarded chicken or hog crate, a bag of chicken feed in a machine shed-all are common hideouts for this pest. It has been found feeding on figs lying on the ground adjacent to infested storages, and in the crevices in the bark of fig trees ten feet above the ground. It has been found in walls of adobe houses where the bricks used for insulation purposes contained debris from an infested mill. No article or object can be overlooked as a host or carrier for this insect.

Losses caused by the khapra beetle have been as high as 70 per cent in some storages, and damage of 25 per cent is not uncommon. Losses are greatest in grain stored undisturbed for a long period of time.

Through January 31 of this year more than 45,000 storages have been inspected one or more times for an aggregate of 62,000 inspections in 38 states. About 1,200 sites have been inspected by the cooperating agencies of the two countries in the

Eradication

Republic of Mexico. This inspection work has resulted in the discovery of infestations on 143 sites in Arizona, 283 in California, 5 in New Mexico, and 40 in the Republic of Mexico.

Eradication of khapra beetle posed a new 'experience in fumigation. Liquid fumigants commonly used for the control and eradication of storage insects will reduce populations of the khapra beetle, but they will not eradicate infestations. Interior fumigation with gases was ineffective because the khapra beetle moves to the outside of storage structures under the pressure of large population build-up. Experiments did show, however, that the beetle could be killed in all stages of development by fumigation with methyl bromide at 3 to 4 pounds per 1,000 cubic feet. The methyl bromide fumigation treatment was finally adopted as the eradication procedure. A 5-pound initial dosage was arbitrarily selected as a quarantine requirement to assure a complete kill under the most adverse conditions. The gas must be maintained at 32 ounces per 1,000 cubic feet for any 24 hour period of the 48 hours the fumigation is under way.

Entire storage facilities, some involving a series of buildings, are

wrapped in gastight tarpaulins and completely sealed against the escape of the fumigant. The largest of these structures, one of nearly 5 million cubic feet, required 91/2 acres of covering material fastened together with 35,000 clamps. A charge of 161/2 tons of methyl bromide was required to effect eradication. Circulatory systems are set up within the structures to circulate the gas throughout the mass of stored commodities and the open spaces of the building. Checking stations located throughout the storage connected to gas analyzers on the outside provide a check on concentrations at regular intervals while the structures are under the wraps.

As a safeguard against spread of the insect during the time the building is being wrapped and treatment is under way, an area of 100 feet in diameter surrounding the site is sprayed three times at three-day intervals with a solution consisting of 5 pounds actual malathion to 100 gallons diesel oil.

Progress during the two years of the treatment program has been very substantial. As of January 31, 416 of the 471 infested storages, with a combined volume of 120,632,701 cubic feet, had received fumigation There remain only 55 treatment. storages with a volume of 26,312,772 cubic feet to be treated in the future. More than half of those are currently under contract and on some the treatment is under way. All known infestations in the State of New Mexico and Republic of Mexico have received the fumigation

The khapra beetle eradication program has provided a good test of the new approach of State and Federal quarantines that apply to this program. These quarantines depart from the usual concept of insect pest regulation. Instead of the quarantines applying to definite political subdivision or to well-defined geographical boundaries, the regulations apply only to properties which through inspection have been found infested. They are premise type quarantines wherein only the site of the infestation and all buildings of common usage on the site of infestation are placed under regulation. The regulation applies to any article or thing which by reason of exposure contributes a hazard of spread of the pest. To be effective, the premise type quarantine must be supported by an inspection program applied immediately and widely throughout the suspect area. The most common hosts with which the beetle has been found associated are barley, corn, rice, wheat, milo, cottonseed, and other high protein products. The regulatory measures that have been applied under the provisions of these quarantines have been effective in confining the infestation to the states where it was found originally.

Even though progress toward khapra beetle eradication is very encouraging, no one connected with the program is overlooking the vagaries of the problem. It is known that light infestations are difficult to find and there have been many opportunities for spread through movement of host materials and other commodities. Much survey will have to be done before infestations are completely delimited in the infested states and before we can be sure that the pest has not spread to other parts of the country. There must be continued vigilance at the ports of entry to prevent new introductions from foreign sources. **

CUMULATIVE SUMMARY

State	Total Infested Sites	Total Valume Infested Sites	Sites Treated	Volume Treated
		(Cu. ft.)		(Cu. ft.)
Arizona	143	57,938,573	108	35,761,923
California	283	76.961,500	263	72,825,378
New Mexico	5	415,400	. 5	415,400
Republic of Mexico	40	11,630,000	40	11,630,000
Totals	471	146,945,473	416	120,632,701

URING 1955, Geigy Chemical
Corporation, New York, released to experiment station
personnel for test purposes, an experimental herbicide designated Geigy
444E (Chlorazin). The herbicide
contained as active ingredient 2-chloro-4, 6-bis-(diethylamino)-s-triazine.

Preliminary acreening tests, and field tests conducted during 1954 and 1955, indicated that Geigy 444E might be useful as a pre-emergence or post-emergence herbicide on a number of crops which included corn, cotton, snapbeans, peas, carrots, onions, potatoes, and a few other crops. A number of research work-

acre. The effective dosage rate may be greater or less than 2 pounds per acre, depending somewhat upon the soil type and predominant weeds present. In sandy soils, some research workers have obtained excellent weed control with Simazin at a pre-emergence dosage rate of 1 pound per The accompanying photographs, courtesy of Dr. O. H. Fletchall, University of Missouri, show the weeds in check plots, and in corn plots treated with Simazin pre-emergence at a dosage rate of 2 lbs. per acre and pre-emergence at 4 lbs. per acre. Predominant weeds in the check plots included crabgrass, foxtails,

research workers that the corn plants growing in Simazin-treated soil are larger in size, greener in color, and produce greater yields of corn than produced in adjacent plots treated with other herbicides. At present, we are unable to explain satisfactorily the mechanism producing this apparent stimulation.

In addition to corn, Simazin appears promising in a few other crops, including tomatoes, grapes, potatoes, asparagus, and a few ornamentals.

SIMAZIN

and related triazines as herbicides

ers conducted continued tests with Geigy 444E during 1956. Generally, the compound has to be used at a dosage rate of 6 to 8 pounds per acre to obtain effective weed control. At the above dosage rates, the compound is rather effective against broadleaf weeds but is not too effective against grassy weeds.

During 1956, an experimental herbicide related to Geigy 444E and designated Simazin, was released to experiment stations for test purposes. The results obtained with Simazin by various research personnel during the past season, and results obtained with several related triazine compounds in field test plots are summarized in this article.

Simazin, chemically, is 2-chloro-4, 6-bis-(ethylamino)-s-triazine. The technical product is a white crystalline substance having a melting point of 225°C., and is insoluble in water. It is comparatively non-toxic; the acute oral LD₅₀ to mice is greater than 5 gr./kg.

Compared to Geigy 444E, Simazin appears to be 4 to 6 times more effective in controlling weeds. During 1956, the majority of research workers have reported obtaining control of most annual weeds for a complete season, following a pre-emergence application of Simazin at a dosage rate of about 2 pounds per

by Clayton Bartley

Geigy Agricultural Chemicals Co.

western water hemp, carpetweed, bull nettle, and velvet leaf.

Simazin has appeared promising for weed control in several crops, but has been outstanding for weed control in field and sweet corn. A pre-emergence application at a dosage rate as high as 16 pounds per acre has not visibly injured corn, and, as mentioned previously, a dosage rate of about 2 pounds per acre has yielded control of a number of weeds for a complete season. Some of the weeds which have been controlled include pigweed, lamb's-quarters, mallow, witchgrass, nightshade, foxtails, velvet leaf, smartweed, knotweed, mustard, crabgrass, purslane, ragweed, western water hemp, carpetweed, bull nettle, shepherd's purse, water grass, and morning glory. In some cases, weeds such as bindweed, quackgrass, wild buckwheat, white cockle, nut grass, and Canada thistle, have not been controlled at the lower dosage rates although some such as bindweed and quackgrass have been controlled at dosage rates of about 6 to 8 pounds per acre.

An interesting side-reaction is the stimulating effect which applications of Simazin appear to produce in corn. It has been noted by several Presently, we are attempting to obtain information on the residual activity of Simazin in various types of soil. Indications are that the compound, when used at a dosage rate of two pounds per acre, will not persist in the soil the following year, although additional studies will be conducted for clarification.

Simazin was sold on a limited scale in Switzerland during the past season, for use as a soil sterilant for control of weeds along railroad beds, pathways, and rights-of-way. Generally, it was suggested that the compound be utilized at a dosage of 5 to 10 pounds per acre, with a sufficient quantity of water applied for penetration of the material to root systems of weeds.

Tests are also under way currently in the United States in which Simazin is being tested as a soil sterilant.

In regard to the newer triazine compounds, three such herbicidal candidates were field tested during the past season, comparing their activity to Geigy 444E, Simazin, and suitable standards. The newer triazines tested included the compounds G-27901, G-30028 (Propazin), and G-30031. Following is the chemical configuration of each compound and

their chemical relationship to each other:

Each of the triazine compounds was tested as both pre-emergence herbicide and post-emergence herbicide. The tests were conducted in a clay loam soil having a pH value of 6.6 and an organic matter content of 5.2%.

In the pre-emergence test, the general procedure was as follows: 2 rows of each of the following crop seeds were planted June 13... oats, soybeans, wheat, alfalfa, snap beans, ladino clover, lima beans, cotton, peas, spinach, carrots, onions, rye grass.

acre. Sinox, CIPC and CDAA, used as standards, were applied at 4 pounds per acre. Each treatment was applied as a 4-foot wide band, making each plot 4 feet wide by approximately 75 feet long; each treatment was replicated 3 times, with unsprayed check plots maintained. The chemicals were mixed with water applied at a rate of 36 gallons per acre.

The plots were rated for weed control and crop reaction on July 18 (about 1 month after application) and again on August 22 (about 10 weeks after application). Predominant weeds present in the plots in-



corn and cucumbers. On June 14, one day after planting, each of the various chemical compounds was applied by spraying across or perpendicular to the planted rows. Each of the experimental compounds was used at dosage rates of 2, 4, and 8 pounds per acre, except Simazin, which was utilized at dosage rates of 1/2, 1, 2, 4, and 8 pounds per

cluded pigweed, lamb's quarters, ragweed, common purslane, smartweed, horse nettle, crabgrass, quackgrass, foxtail, and barnyard grass.

Weed control and selectivity exhibited by the compounds differed quite extensively, as shown in tables 1 and 2. The results of the pre-emergence test can be summarized as follows:



TABLE 1.

Effect of pre-emergence application of triazine-derivative compounds on weed control

	Dosage Rate	% Weed Control					
Compound	lbs. Active/A	Broadleaf Weeds	Grassy Weeds				
Chlorazin	2	91	22				
(Geigy 444E)	4	89	49				
	8	97	60				
Simazin	1/2	83	47				
(G-27692)	1	99	86				
	2 .	100	96				
	4	100	98				
	8	100	100				
G-27901	2	97	55				
	4	99	80				
	8	100	94				
Propagin	2	99	2577 3 84				
(G-30028)	4	99	86				
	8	100	91				
G-30031	2	98	57				
	4	97	49				
	8	100	89				
Sinox	4	47	17				
CIPC	4	36	60				
CDAA	4	66	63				
Check	*******						

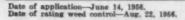




TABLE 2. Effect of pre-emergence application of triazine compounds on plant growth

	Chlorazin, 2 lbs.	Chlorazin, 4 fbs.	Chleruzin, 8 lbs.	Simazin, 0.5 lbs.		Simazin, 2 lbs.	Simazin, 4 lbs.	Simoxin, 8 lbs.	G-27901, 2 lbs.	G-27901, 4 lbs.	G-27901, 8 lbs.	Propazin, 2 lbs.	Propazin, 4 lbs.	Proposin, 8 lbs.	G-30031, 2 lbs.	G-30031, 4 lbs.	G-30031, 8 lbs.	Check
Corn	10	9	<10	<9	<10	8	<10	10	<10	<10	9	11	>10	<9	<10	9	>11	10
Soybeans	>9	<9	<8	<9	7.	0	0	0	<9	>2	0	<2	0	0	9	>6	0	10
Wheat	9	<9	<9	9	7	1	0	0	>4	0	0	>2	0	0	>5	0	0	10
Alfalfa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10
Snapbeans	<9	>8	>7	<9	<7	>2	0	0	7	>4	<2	0	0	0	<7	6	0	10
Clover	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10
Lima Beans	>8	8	<9	9	<4	1	0	0	8	7	0	0	0	0	>2	0	0	10
Cotton	<11	<9	<11	>9	>8	<7	0	0	>8	<7	4	8	<9	0	8	<7	0	10
Peas	>8	<9	1	9	>7	<3	<2	0	<10	>7	>8	<6	>5	0	9	4	<7	10
Spinach	<11	<7	0	>3	<2	0	0	0	0	0	0	0	0	0	0	0	0	10
Carrots	11	<10	<8	6	>3	0	0	0	< 3	<7	>2	5	7	<9	<8	<5	0	10
Onions	<10	9	>8	<7	>6	>2	0	0	< 3	4	0	0	0	0	<7	>3	0	10
Rye Grass	9	9	<6	<8	>6	0	0	0	<5	0	0	>4	0	0	7	2	0	10
Oats	>8	<6	>4	<9	->8	<4	0	0	<6	0	0	>3	0	0	>8	0	0	10
Cucumbers	<10	<6	2	>6	>2	0	0	0	0	0	0	0	0	0	0	0	0	10

Date of planting-June 13, 1966, Date of application-June 14, 1966.

Date of rating crop tolerance—August 22, 1956. Rating Scale—10—no effect; 0—dead.

- 1. At equivalent dosages, none of the compounds equalled Simazin for control of broadleaf and grassy weeds. Simazin, at a dosage rate of one pound per acre, gave 99% control of broadleaf weeds and 86% control of grass weeds for 10 weeks; the two pound dosage rate yielded 100% and 96% control, respectively, of broadleaf and grass weeds.
- 2. Each of the triazine experimental compounds, even at the lowest dosage rate of two pounds per acre, gave over 90% control of broadleaf weeds 10 weeks after application of the herbicides. Control of grassy weeds was less satisfactory at the lowest dosage rate; it varied from 22% with Geigy 444E to 84% control with G-30028.
- 3. G-30028 and G-27901, at the 4 pounds dosage rate, gave 99% control of broadleaf weeds and 80% control of grass weeds for 10 weeks.
- 4. Each of the triazine compounds was superior to the standard materials for weed control.

- 5. As far as selectivity is concerned, corn is tolerant to each of the triazine compounds tested.
- 6. The most susceptible crops utilized in the test appeared to be alfalfa, clover, spinach, and cucumbers.
- 7. At a dosage rate greater than 1 pound per acre, Simazin injured all crops except corn.
- 8. G-30028 performed comparably with Simazin, except cotton was more tolerant to G-30028 than to Simazin.
- 9. G-27901 was less selective

than Geigy 444E but was more selective than Simazin. G-27901, at a dosage rate of 2 pounds per acre, did not appreciably injure soybeans, lima beans, cotton, peas, or corn.

10. G-30031 appeared promising for weed control in soybeans, cotton, and peas, as well as

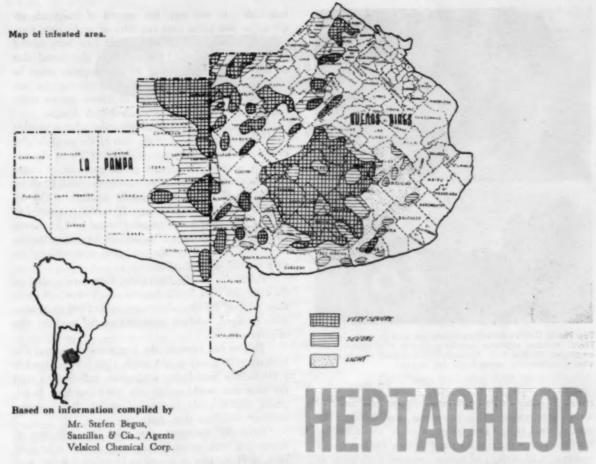
A post-emergence test was conducted in which the same crops, size of plots, number of replications, and

(Continued on Page 113)

TABLE 3. Effect of post-emergence application of triazine-derivative compounds on weed control

Compound	Dosage Rate lbs. active/A	% Weed Broadleaf Weeds	Control Grassy Weed		
Chlorazin	2	43	64		
(Geigy 444E)	4	79	36		
,,	8	89	56		
Simazin	2	23	70		
(G-27692)	4	46	80		
	8	42	87		
G-27901	2	61	52		
	4	57	86		
	8	85	88		
Propazin	2	63	74		
(G-30028)	4	87	. 78		
	8	89	59		
G-30031	2	98	45		
	4	100	83		
Check	-	enement.			

Date of application-August 22, 1956. Date of rating weed control-September 29, 1956.



for grasshopper control in Argentina

Down in Argentina "Tucura" means grasshopper, and grasshoppers mean trouble in anyone's language. Cattle breeders and farmers in the provinces of Buenos Aires and La Pampa, like their counterparts in the United States, have suffered serious crop losses during recent years because of the voracious appetite of this fast moving, robust insect.

Eggs of the "Tucura" (Dicroplus arrogans st.) hatch in late spring. In Argentina, this is around the end of October. By the end of December, and on into March, they devastate all crop and pasture land within their reach. Natural grasses, corn, small grains, sunflowers (grown for seed oil), alfalfa, and early sowings for pasture are all victims of their damage. Last year, some 15,000,000 acres were infested with grasshoppers in Argentina, and their record of destruction was staggering. Authoritative sources estimate that prior to control, crop losses resulting from grasshopper infestations had reached the equivalent of 180,000 tons of beef. This could equal Argentina's annual beef export to England, and could represent a financial loss of \$90,000,000!

The problem had become so acute by 1956 that both the national and provincial ministries of agriculture, through their acridiology and pest control divisions, stepped in to help local agricultural officials and private interests in an all-out grasshopper control campaign. For the first time, the government program was switched from BHC to other insecticides, and the results were substantially better than in previous years.

Significantly, the Argentine Ministry of Agriculture attributes a large measure of this success to Heptachlor, which was used for the first time in the "Tucura" campaign. More than 500,000 pounds of Heptachlor were unloaded in Buenos Aires in September of 1956, and distributed to the Ministry of Agriculture, provincial agriculture departments, and private firms, for formulation into emulsifiable concentrates and oil solutions.

Information concerning the government's grasshopper control program was disseminated throughout the infested areas, and participation was made compulsory. Landowners who failed to cooperate were liable to heavy fines. Officials had little trouble securing full voluntary cooperation, however, because of the heavy losses grasshoppers had caused in preceding years.

Equipment used in the campaign included 400 sprayers, 55 airplanes, and 3 helicopters. Tri-engine Junkers and Piper J-3's were fed from six-ton tank trucks, and were used to spray crops, pastures, and fence



Top Photo: Chalde Sprayed mounted on pickup truck. Bottom Photo: Velsicol engineer checking records with government employes. In this field, Heptachlor maintained effectiveness after four days, in spite of 25 mm rainfall

rows. "Tuwa" turbine mistblowers were also used to spray large areas. This equipment was mounted on small trailer tanks, and pulled through the fields by tractor. Along the roadsides and ditches, flat bed trucks equipped with tanks and micron sprayers were used, as well as "Chalde" five-nozzle sprayers mounted on pickup trucks and supplied from two 52.8 gallon (200 liter) tanks. Also used were a limited number of sixteennozzle low pressure sprayers, mounted on pickups.

The effectiveness of Heptachlor on both natural grass land and cultivated areas, plus the "fan" migration pattern of grasshoppers, made it possible to use the "strip method" of treatment in many areas. Heptachlor formulations were sprayed on strips ten to fifteen meters wide, separated by untreated bands twenty meters wide. In this way, the amount of insecticide required, as well as the time and labor of application, were reduced to about 1/3 of what would have been needed for complete coverage. Some farmers also found that a cultivated field threatened by grasshoppers could be protected with equal effectiveness, and economy by surrounding it with a band, ten to fifteen meters wide, treated with Heptachlor at recommended dosages.

The campaign was carried out under adverse weather conditions. Heavy rains at the start of the program plus drought and high temperatures (over 95°F.) at the end made it necessary to control grasshoppers in all stages of their life cycle. For this reason, the dosages of insecticide used had to be carefully calculated. On the average, Heptachlor was applied at the rate of 294 lbs. per acre of technical material (equal to 3.33 ounces actual). This dosage is equivalent to approximately one ounce per acre for the total area protected by the strip method of application.

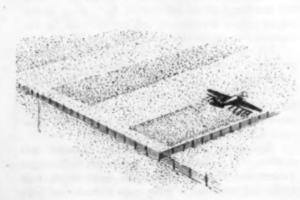
Practically all the Heptachlor formulations used in the campaign were liquid, because oil solutions and emulsions offered definite advantages over dusts in storage space required, handling, quantities needed per acre, and effectiveness.

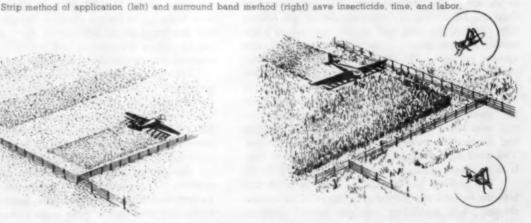
To give one example, the dust required to treat 100 hectares (250 acres) would weigh 1500 kilograms, while a Heptachlor emulsifiable concentrate sufficient to treat the same area would weigh only 100 kilograms. In addition, liquids could be applied under more adverse weather conditions than dusts.

Generally, emulsions were used for application of Heptachlor with ground equipment, and straight solutions of Heptachlor in gas-oil or Diesel-oil solvents were used for aerial applications. Emulsions were more suited to ground application because they were non-phytotoxic, and could be used on tender new growing vegetation.

Oil solutions were better for air application, because the fine dispersion of the spray droplets and low volume per acre nullified the phytotoxcicity of the solvents, and these solvents would not vaporize, as water would, when the formulations were applied from greater distances above the ground.

(Continued on Page 123)





3 ton of Superphosphate

-A Profitable Investment

HERE'S a new concept about the use of fertilizers that makes sense. The initial cost of fertilizer is to be considered a capital investment and the extra yields of crops resulting from its application are the interest derived from this investment. Then after the basic application of fertilizer has been made to an adequate level, the subsequent annual applications of fertilizer are to be considered a part of the operational cost.

Who is author of these ideas? Dr. C. M. Woodruff, of the University of Missouri. He comes to these interesting conclusions after a 7-year investigation of the effectiveness of phosphorus fertilizer on a forage crop grown on a phosphorus-deficient soil. The investigation was carried on under controllable greenhouse conditions. In setting up his comprehensive tests Dr. Woodruff organized his study around the following questions:

 How much phosphorus mixed throughout the soil is needed to establish satisfactory yields for a succession of meadow crops in a rotation?

Would a soil test reflect satisfactorily the levels of phosphorus furnished by applied fertilizers?

3. Is it possible to use the soil test results as a basis for predicting the fertilizer required to establish an adequate level of phosphorus in a deficient soil?

4. Supposing an amount of phosphorus is applied which is sufficient to furnish good plant nutrition throughout a rotation cycle, how much if any of the applied phosphorus will be lost as a result of chemical reaction or "fixation?"

5. Suppose a soil is brought to a satisfactory level of phosphorus fertility at the beginning of a rotation cycle, and after the cycle is completed, how much phosphorus will then be required to restore the phosphorus in the soil to the original level?

 Time is a factor in the history of phosphorus nutrition in any soil.
 What are the economic relationships of different amounts of applied phosphorus with respect to time?

You will agree these are good questions and if the experiment is designed so as to answer them, the answers and the manner in which the investigator sought them should make not only a good story but should carry conviction to agronomists, farmers and the fertilizer industry.

What follows is a brief resume of Dr. Woodruff's report.* The writer saw first-hand the greenhouse setup of this investigation in Dr. Woodruff's laboratory.

Procedure: The soil chosen for the test was a Shelby loam very deficient in available phosphorus and very low in organic matter. Lime, nitrogen as ammonium nitrate and muriate of potash were added to the soil in amounts to furnish a pH of 6.5 to 7.0 and 100 lbs. each of nitrogen (N2) and potash (K3O) per acre, basis 2,000,000 lbs. of soil. Each rate of P2O3 was duplicated. Crop used: red clover which was reseeded twice during the rotation period. Whenever deficiency symptoms appeared in the clover, additional nitrogen and potassium were applied at the original rates. The soil testing technique evolved by Dr. Roger Bray of the Illinois Agricultural Experiment Station was employed for the soil tests.

Net results as net interest on capital invested

A GRONOMISTS and many farmers know that the yield to be expected from increasing increments of a fertilizer will diminish to a point where the increases will not pay for the cost of the increment. That point where the yield just pays for the cost

*Given at meeting of Middle West Soil Improvement Committee, Feb. 15, 1987.

A Digest of Research at Missouri Experiment Station by Vincent Sauchelli

of the last increment is considered "the intensive margin," the term used by economists to indicate that further increments of fertilizer should not be applied, assuming, of course, that all fertilizer elements and growth conditions are in balance for profitable yields.

In this investigation the yields kept increasing right up to the rate of 1280 lbs. of P₂O₅ per acre, equivaent to 6400 lbs. or 3.2 tons of 20% superphosphate. The data in Table 1, cited by Dr. Woodruff from his results, tell this story well:

The total forage harvested at the end of the second season showed an increase in direct proportion to the amount of P₂O₅ applied up to the rate of 160 lbs. of P₂O₅; for each pound of P₂O₅ there was an average return of 0.5 gram of hay per pound, equivalent in the conditions of the test to 100 pounds of dry forage per acre.

Above the rate of 160 lbs. P₂O₅ per acre the average return was 0.124 gram of hay per pound of P₂O₅, equivalent to 25 pounds of dry forage per acre. This rate of return was constant up to the 1280 lbs. P₂O₅ per acre rate. Hence, the total yield increased more than twice, as the amounts of P₂O₅ increased from a rate of 160 lbs. to 1280 lbs. P₂O₅ per acre.

If the phosphorus is given a cost of 8 cents per pound, and the hay a value of \$10 per ton, Dr. Woodruff calculated the investment of \$10.80 (160 lbs. x 0.08) grossed

\$80.00 and the net return was \$69.20 (80. — 10.80).

At the end of the 7-year period, the efficiency of the initial rate of 160 lbs. P₂O₅ per acre rose from 0.50 gram to 0.74 gram of hay per pound of P₂O₅, equivalent to 148 pounds of hay and the corresponding net return on the investment to \$107.20 per acre. During the same period the efficiency of the 1280 pound rate increased from 0.124 to 0.238 gram of hay per pound of P₂O₅ applied which made the total net return for the heaviest rate \$385.60 or an average annual return of \$55.10.

Two principles apply

HE author appreciates that the conditions, economics and results of pot experiments in a greenhouse are not the same that would be expected from yield experiments. But he maintains that the principles involved may be considered as applicable to both conditions. He deduces two principles, namely, (1) that meadow crops need a high level of phosphorus in the soil in order to sustain a satisfactory production over an extended period of years; and (2) that when dealing with a nutrient such as phosphorus the economics of its use should be considered in terms of the level of phosphorus in the soil at which the increases in yields pay for the interest on the investment in terms of additional phosphorus and not in terms of the "intensive margin." It appears from this study that when a soil is deficient in phosphorus a basic applica-

tion of 500 to 600 pounds of PaOs per acre is required to establish a suitable level of phosphorus. If the amount of phosphorus which is removed by crops is replenished at regular intervals so as to maintain the basic level previously mentioned, it is estimated that interest at the rate of 5% on the initial investment would amount to about \$2.00 to \$2.50 per annum. If hay is valued at \$10.00 per ton, it means that only about one fourth of a ton of hay would defray this interest charge on the investment. The amount of phosphorus replenishment necessary to maintain the desirable level is to be considered an operation cost and in this test amounted to about 80 cents per ton of hay-assuming one ton of hay contains only 10 pounds of P2O5 costing 8 cents per pound.

Soil test results

TSING Bray's technique involving a strong acid extracting reagent, Dr. Woodruff concluded that the test soil should release 200 pounds of P2Os per acre with this acid reagent, and this extraction should remove about one-third of the total extractable phosphorus present in the soil. The results of the soil test confirmed Dr. Bray's observations. The yields of clover were in close agreement with the test. For example, the untreated soil tested only 19 lbs. of P2Os per acre, 181 lbs. less than the desirable level. To bring the level to 200 lbs., therefore, it would be necessary to apply three times 181 lbs. or 543 lbs. of P2O3.

Actually, the increments of applied P₂O₈ nearest to this quantity were 320 and 640 lbs. respectively; extraction with the strong acid showed 115 lbs. and 282 lbs. of P₂O₈, respectively. It is safe to assume that an application of 543 lbs. of P₂O₈ per acre would have satisfied the requirement of 200 lbs. of P₂O₅ per acre, the amount reported by Dr. Bray as necessary for satisfactory results.

Amount of P.O. removed by crop

O maintain a satisfactory phosphorus level in the soil, it is necessary to replace the amount lost by crop removal during the period such crop occupied the soil. Clover hay contains, according to Henry and Morrison, 10 lbs. of P2O5 per ton. In Table 1, the yields reported in grams per pot are equal numerically to the pounds of P2Os per acre removed by the crop. By the end of the seventh year of the experiment, the removal of P2O5 by the crop had exceeded the amount originally applied, except in those pots receiving more than the 320 lbs. per acre rate, that is, the 320, 640 and 1280 lb.

Ordinarily, the yield of clover and alfalfa hay may be expected to average from 21/2 to 4 or 5 tons per acre, annually. Therefore, the annual removal of P2O5 by such crops would range from 25 lbs. to 40 or 50 lbs. per acre. Hence, even though it might be necessary to make an initial basic application to a soil of 400 to 600 lbs. of P2Os per acre (1 to 1.5 tons 20 per cent superphosphate equivalent), it would still be necessary to apply at least 50 lbs. per acre of P2O5 following a two-year stand of meadow hay and a top dressing of about 40 to 50 lbs. of P2Os (200 to 250 lbs. 20 per cent superphosphate) per acre each year to maintain a satisfactory level of phosphorus in a soil growing alfalfa.

In other words, the general practice is to fertilize only the crop. This neglects the basic level in the soil which is indispensable to a profitable operation. May not this be the reason why meadow crops on most farms are not as satisfactory profit-wise as they should be.*

Yield of Dry Forage, Shelby Clay Loam, Treated With Different Amounts of 20% Superphosphate Fertilizer, 1950.

		Total Yields*	
P ₂ O ₅ Applied lbs./ecre**	1st 2 yrs. gms./pot.	1st 4 yrs. gms./pot.	7 yr. period gms./pot.
0 .	17.0	41	59
20	26.8	49	69
40	36.0	62	83
80	61.1	88	116
160	96.7	128	177
320	117.0	178	262
640	159.0	283	384
1280	236.0	410	547

The yields in tons equivalent are equal numerically to 001 of the weights as given in the table; for example, 17.0 gm/pot equivalent to 1.7 tons/acre.

**No phosphorus was applied beyond these amounts applied initially.

Apple

Powdery Mildew

By R. S. Kirby Pennsylvania State University

D URING the past three years, since powdery mildew has become severe in the eastern part of the United States, statements have been made claiming that organic fungicides give us mildew, that apple mildew will destroy apple growing in the east, and that the sulfur program never gave us a problem like this.

To better understand powdery mildew on apples let us examine the history and life cycle of the fungus causing powdery mildew.

Two powdery mildew fungi have been reported as occurring on apple, Podosphaera leucotricha and P oxyacanthae. However, it is now generally agreed that most of the mildew on apples is caused by Podosphaera leucotricha. In addition to apples, this species of mildew fungus attacks pear, quince, hawthorn, serviceberry, cherries, and plums. However, the common mildew on cherries is Podosphaera oxyacanthae.

The fungus causing powdery mildew on apples is a native of North America. It was first reported in 1871 on seedling apples in a nursery at Ames, Iowa. This report was followed by numerous reports from both east and west of the Rocky Mountains. Powdery mildew was first reported from Europe in 1889 and Australia in 1892. It is now present in all the most important apple growing regions of the world.

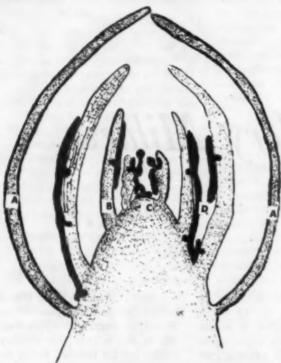
In 1918 Dr. D. F. Fisher in U. S. D. A. Bulletin 712 stated, "apple powdery mildew is usually considered as of only minor importance and principally affecting nursery stock in the eastern part of the United States." The first serious outbreak in bearing apple trees occured during 1914 in the Pajaro Valley of California. This was followed the next year by a severe outbreak at Prosser, Washington. Mildew has become most destructive in the central, warm, irrigated valleys of the Northwest. In 1927 Woodward in England reported that mildew was severe in the dry year of 1921 and later became a factor of great economic importance. In the eastern part of the United States, until the late twenties, powdery mildew was almost unknown in commercial orchards. In the Cumberland-Shenandoah Valley, powdery mildew started to build up rapidly in the late twenties. Cold winters in the early thirties had apparently killed the mildew since it almost entirely disappeared from commercial orchards. In 1954, however, it reappeared in epidemic proportions. Mildew continued to increase in the apple growing areas during 1955 and caused the greatest damage on record to eastern orchards. In 1956 special control measures and unfavorable weather reduced the loss from mildew to slightly below the 1955 figures.

John C. Dunegan of the United States Department of Agriculture informed the writer that reports coming to him indicate that powdery mildew loss has increased during the past several years in most of the larger apple growing areas of the world.

The fungus causing powdery mildew on apples has developed some unique means to enable it to live from year to year and spread during the growing season.

While the fungus causing powdery mildew can pass the winter in thick-walled spore cases like the apple scab fungus, it has a more effective means. The mildew fungus has the ability to overwinter as cobweb-like filaments or mycelium within lateral and terminal leaf and flower buds and be active as soon as these buds open.

The mildew fungus in each bud seems to be able to infect all the leaves and flowers in that bud so that each leaf that develops during the next season from that bud will be covered with mildew. Woodward reports that chains of summer spores may be found inside the buds and be ready for distribution as soon as the bud opens. In both 1955 and 1956, in Pennsylvania, flower bud leaves covered with mildew were found before they reached the pre-pink stage. As soon as the white mycelium establishes itself on leaves, buds or stems, nu-



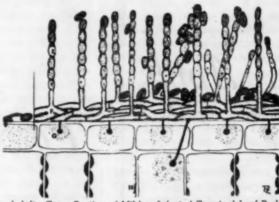


Fig. 1, left—Cross Section of Mildew-Infested Terminal Leaf Bud.

A. Bud Scales.

B. Start of leaf development.

Growing point of bud.

Solid black lines represent mycelium of the fungus with houstoria in leaves and growing tip.

above - Cross Section of a Mildew-Infested Leaf. A chain of summer spores or conidia being produced on

upright fungus hyphae. F. Mat of the mildow—causing fungus on upper surface of a leaf. The fungus mycelium is oily and difficult to wet

G. Epidermal and palisade cells of leaf showing the fungus houstoria which is the only part of the fungus that enters leaves, flowers and young stems.

H. Chloroplasts in palisade cells, destroyed when cell is in-

mildew continues to be active until the death of the leaves.

Apple varieties vary widely in their susceptibility to powdery mildew. Under eastern conditions such standard varieties as Jonathan, Rome, Cortland, and Baldwin are the first to become infected. These are followed closely by outbreaks on McIntosh, Yellow Transparent, and Stay-Under orchard conditions, even York and Red Delicious became infected when surrounded by mildewed varieties. Golden Delicious, Grimes, etc., are less frequently infected.

Mildew Control Investigations

HE first extensive work on control was by Galloway in 1889 who later reported successful use of ammoniacal copper carbonate in controlling mildew. In 1894 Pammel in Iowa recommended bordeaux. Since copper fungicides like bordeaux and ammoniacal copper carbonate caused severe fruit and leaf injury, they were superseded by sulfur. Sulfur continued to be the principal fungicide for apple diseases, including mildew, until the late 1940's when organic fungicides came into wide use. Sulfur fungicides are usually considered to cause less injury than copper, but sulfur fungicides dwarf apple foliage, and reduce tree yields, and, when applied in hot weather, cause sulfur scalding on fruit and leaves.

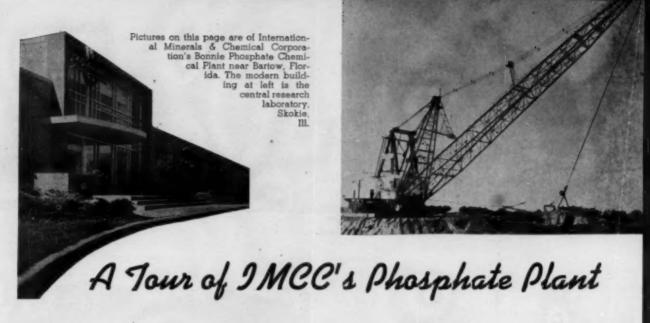
The use of organic fungicides "let down the bars" to powdery mildew so that when a number of conditions became favorable to the spread and development of this disease it increased rapidly and became a serious problem. Organic fungicides like ferbam, captan, and glyodin were found to be about as effective as sulfur against scab and the other common apple diseases (excepting powdery mildew) and had the advantage that they caused far less fruit and foliage injury. Their use enabled apple trees to develop large uninjured foliage which could utilize more nutrients and give higher yields per tree. Many growers did not wish to go back to the use of sulfur, so the organic fungicides Karathane or Mildex were used in combination with the other organic fungicides.

Unfortunately, the use of Karathane or Mildex, like sulfur, reduces only partially the percentage of mildew-infected buds. This leaves some infected buds in which mildew

(Continued on Page 115)

merous erect fungal branches produce countless numbers of barrelshaped summer spores (conidia) in chains. These spores break away and may be blown for long distances Mildew spores differ from those fungi causing other apple diseases in that they normally do not sprout and grow in drops of rain water. The conidia or summer spores of the mildewcausing fungus germinate best on dry or nearly dry leaves at near the dew point. The temperature at which they will germinate is reported as 50° to 68° F. with 91° F. causing their death. (Shaded leaves may be several degrees cooler than air temperature). Rainfall is usually considered unfavorable to mildew, but high humidity and fog favors the development of this disease.

The mildew fungus can most easily attack tender apple leaves of high water content, which means the new leaves as they unfold. This accounts for the slowing down of the rate of spread of mildew by late June when most terminal leaf growth stops. If weather or cultural conditions start growth later in the season, mildew may again become severe. On water sprouts and suckers where growth usually continues until frost,



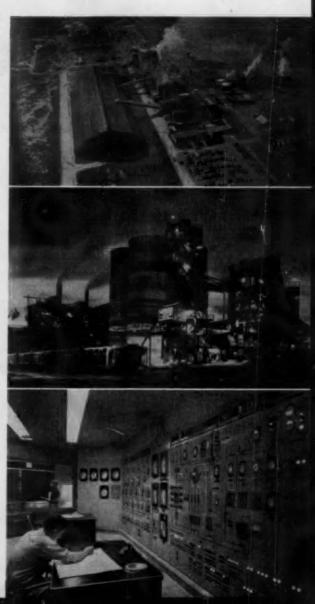
ELEVEN million of the thirty million tons of phosphate rock produced in the world per year comes from Florida, where the largest producer of phosphate is International Minerals & Chemical Corp. An idea of the size of IMCC's activities at its Noralyn facility alone is noted in the facts that in a single day Noralyn uses more water than would be used by a city the size of Cincinnati or Minneapolis and enough electrical power for a city of 25,000 population. The Noralyn mine and the IMCC plant near Bartow, Fla., are among the most advanced phosphate production facilities in the world. They were opened in 1948 with an investment of more than 10 million dollars.

Large draglines are used in mining phosphate. The largest of these machines is capable of mining 2400 tons per hour (figure at top is the "Super Scooper"). The phosphate ore is sluiced with streams of high pressure water to the suction of a large pump and then transported through pipe lines to a washing plant where clay, sand, and fine phosphate are removed from pebble phosphate. The pebbles are then scrubbed free of adhering clay and sand, screened again and placed in bins. From these bins phosphate is loaded into railroad cars for shipment to the drying plant.

Additional recovery of the fine phosphate removed in washing is accomplished by flotation, following which the phosphate is dried and stored for shipment.

A considerable portion of the phosphate rock produced is used for the manufacture of triple superphosphate. Estimated production of triple super in the United States is on the order of 2,300,000 tons per year. The Florida area is expected to have a production capacity of 1,600,000 tons per year in 1957.

Basically, the process for the production of triple superphosphate consists of the acidulation of phosphate rock with sulfuric acid, and the resultant conversion of the phosphate in the rock to phosphoric acid with the elimination of the calcium and sulfate values as gypsum, which is discarded. The phosphoric acid is then reacted with more phosphate rock to form the triple superphosphate.





PRANGE

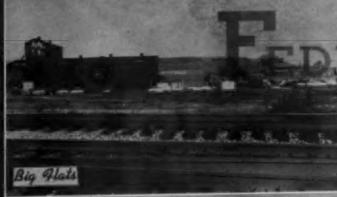


Albany

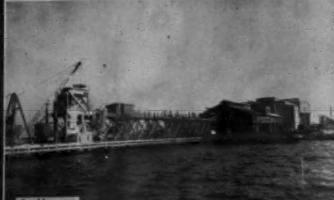




Union City









N practically every field except the government, initials tend to be slightly mystifying. Yet any discussion of the over-all agricultural chemicals picture in the Northeast wouldn't be complete without some prominent mention of the G.L.F., a cooperative listing 118,000 farmer members in New York, New Jersey, and "the northern tier" counties of Pennsylvania. The initials here stand for Cooperative Grange League Federation Exchange, Inc., whose Soil Building Division operates fourteen fertilizer and insecticide plants and is considered one of the strongest and most active of the cooperative's many divisions.

For instance, during the fiscal year ending June 30, 1956 the division, under its manager, J. C. Crissey, marketed a total of 284,500 tons of fertilizer, 400,000 tons of lime products, \$1.8 million in dusts and sprays, \$450,000 in herbicides, and \$800,000 in other miscellaneous farm chemicals. For the 1954-55 fiscal year, this division alone reported a wholesale volume of over \$19 million.

Operating from G.L.F. headquarters in Ithaca, N. Y., where it maintains administrative and distribution facilities, the Soil Building Division also has a fully-equipped control laboratory, with testing and control facilities for complete internal quality control over fertilizer and pesticide production. At this same laboratory, farmer-members may submit soil samples for testing, and a spot check is maintained on all G.L.F. chemical production. The division also has a purchasing department in downtown New York City, close to the offices and distribution points of many of the major bulk producers of agricultural chemicals.

Fertilizer production consists mainly of mixing, granulating etc., and bulk chemical components are purchased from the major producers. In addition to a major producing plant at Baltimore, Maryland, which is owned and operated in conjunction with several other agricultural cooperative, the cooperative operates plants in a number of locations in New York and New Jersey.

Mixed fertilizer and pesticides are produced at four locations-South Kearney and Bridgeton, New Jersey; Canastota and Batavia, New York, and at the newest plant, in Big Flats, New York. A plant at Middletown, New York, produces dust bases which are shipped to the other G.L.F. locations for final formulation. In addition to these six plants, there are installations of the cooperative at seven locations-all of them for mixed goods only. These are at Albany, Bridgehampton, Lyons, and North Collins, New York; Englishtown and Yardville, New Jersey; and Union City, Pennsylanvia.

Though the Soil Building Division does not release production information about its individual locations, it does publish general figures on its entire operation. From 1944 to 1955, for instance, tonnage of mixed fertilizer reached approximately 237,000 tons. During 1955, total division tonnage, amounted to 761,000 tons, including—in addition to the mixed goods,—approximately 27,000 tons of super-phosphate and 497,000 tons of various other materials.

As retail outlets for all these chemical installations there are over 600 G.L.F. farm stores and dealers. Their product lines, running the entire range of agricultural chemicals approved in the tri-state area, are available not only to the 118,000 farmer members, but to non-member farmers, home gardeners, and greenhouse and nursery operators throughout the area.

In 1956, the Soil Building Division initiated a special color campaign, switching from the comparatively

(Continued on Page 119)

What is G. L. F.?

C. I. is an abbreviation of the Cooperative Grange League Federation Exchange, Inc. It is currently supplying farmers and home-owners with feeds, fertilizers and chemicals, petroleum products, seeds, marketing facilities, and miscellaneous farm supplies ranging all the way from barbed wire to milk coolers.

To provide this impressive range of materials and services, G.L.F. operates four large feed mills, fourteen fertilizer and chemical plants, eight seed processing plants, nine marine and two pipeline terminals for petroleum products, and eight wholesale farm supply warehouses. Its marketing service handles 860,000 cases of eggs and two million bushels of grain and beans. It also operates more than 675 retail outlets, 240 G.L.F. owned and the remainder owned and controlled by local farmer coops or agent buyers in the areas they serve.

The cooperative penetrates into the very homes of its members, distributing information on current farming techniques and developments through its every-other-month magazine, "Farming with G.L.F.," and news and entertainment through its widespread Rural Radio Network. The local armual meetings serve a social as well as a business function. And competitions among the younger farmers is stimulated through G.L.F. sponsored Future Farmers of America.

The 37-year old cooperative was founded more or less out of necessity, for prior to 1920 New York State Farmers experienced great difficulty in obtaining feeds, fertilizers, and seeds which could meet recommendations of the N. Y. State College of Agriculture at Cornell. They turned for assistance to their farm organizations—the Grange, Farm Bureau Federation, and Dairymen's League,—and it was under the sponsorship of these organizations that the new cooperative was formed. The late H. E. Babcock, then professor of marketing at Cornell, supplied the guiding hand for the organization and early administration of the G.L.F., which took as its name a combination of portions of the names of the three sponsoring groups.

In 1921 G.L.F. acquired its first real estate, sites in Syracuse and Buffalo, and in the next year extended its stock and services to New Jersey and Pennsylvania's northern tier counties. The 1929 depression stimulated interest in the cooperative, and it expanded rapidly through the Thirties and Fourties.

Since its membership is limited to farmers (and all 14 of its directors are working farmers), the management is controlled directly by the farmer-members through elected committeemen and directors. A farmer qualifies for membership by purchasing one or more shares of common stock, with each member holding only one vote—regardless of the number of shares he holds. Capital returns are limited to 6%, and a "patronage refund" (earnings beyond those needed for taxes, stock dividends, and reserves) is paid back to the members.

In 1947 G.L.F. gave up its right to the federal tax exemption usually enjoyed by cooperatives. This was done specifically to keep the organization farmer-owned and farmer-controlled, since retention of the exemption would have opened the membership to any non-farmers who were substantial purchasers of G.L.F. commodities. In 1954-55 the cooperative paid over \$2 million in federal income taxes, in addition to its normal share of state and local taxes.

Fertilizers won't cake—flow freely in the field

Many a farmer has been cursed by the serious caking problem which so often occurs when deliquescent fertilizers are stored in damp or humid conditions. And many a formulator has learned that this can easily be prevented by using Celite*. These tiny particles of diatomite surround the fertilizer crystals or prills with a protective coating that can prevent contact between them and thus minimize caking.

At the same time Celite fillers improve flowability. The particles are not only microscopic in size but extremely irregular in shape. Thus Celite coated fertilizers flow more freely. As little as 2% of Celite assures more uniform

application in the field.

A Celite engineer will gladly help you put the right grade to work in your fertilizer. Just phone him at your nearest Johns-Manville sales office or write Johns-Manville, Box 14, New York 16, New York. In Canada, address 565 Lakeshore Road East, Port Credit, Ontario.

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INDUSTRY'S MOST VERSATILE MINERAL FILLER

AGRICULTURAL CHEMICALS

Cucumber and Bean

DAMPING OFF

Comparing dusts and slurry, with sprays in the open furrow over the seed, at Bradenton, Florida, Sowell obtained best control with Ortho Seed-Guard and Semesan dust but the experimenters' preferences are for Semesan and Arasan dusts and these are being recommended. Only Terraclor spray gave any injury. (Table 38.)

In a similar test on bean the best control and first choice was with Orthocide slurry. Arasan dust was second and Spergon, third. Only Terraclor and Parsate gave any injury. Arasan and Spergon dusts are currently recommended. (Table 39.)

Cantaloupe

DOWNY MILDEW

A number of interesting combinations were tested by Darby at Sanford, Florida but as mildew was late in attacking the rating is not too firm. The two antibiotics, Streptomycin sulfate and Griseofulvin were least effective. All materials were safe enough. Maneb alone and maneb + Karathane are recommended. (Table 40.)

Celery

CERCOSPORA BLIGHT

Eight materials were compared by Darby in a set of field plots sprayed four-teen times at weekly intervals at Sanford, Florida. None was phytotoxic. First choice went to ziram, ferbam and Cop-Ozinc, with second to maneb. All are recommendable, though Cop-O-Zinc is suggested for organic soil only. (Table 41.)

Cuenmbe

ANTHRACNOSE

In a comparison of three dusts and three sprays at Charleston, South Carolina the best control and best yields were from maneb sprays, with Dithane second. None showed phytotoxicity and all but Tennam are recommended. (Table 43.)

POWDERY MILDEW

One application to plants in a greenhouse in Florida made by Sowell showed Karathane at one half pound and wettable sulfur at two pounds each able to control, though some phytotoxicity resulted from the sulfur. Second best control and the one currently recommended was achieved with maneb at 1.5 pounds. Griscofulvin was little better than the check. (Table 44.)

Cucumber

DOWNY MILDEN

In a comparison of maneb, nabam, zineb, a neutral copper, and an alternate schedule of nabam with captan conducted at Bradenton, Florida on replicated field plots throughout the season twice a week, Sowell reports all satisfactory but CMZ which was phytotoxic as was the alternate nabam and Tribasic copper schedule. First and second choices were maneb and nabam

FUNGICIDE TESTS—1956

Part 4

+ ZnSO₄. These and Dithane Z78 are recommended. (Table 42.)

Anthracnose, downy and powdery mildews

Eleven materials or combinations were compared as sprays in field plots at the Virginia Truck Station by Nugent. Anothracnose and downy mildew were present the entire season, August-October and powdery mildew came in late. A little burning occurred from tribasic copper used at four pounds but all others were safe. The two experimental fungicides, Geigy 27810 and Cal. Spray Co. HL877 are not believed worthy of future trials. Manzate Dithane Z-78 and Tribasic copper are currently recommended. (Table 45.)

Lettuce

DOWNY MILDEW, BOTTOM ROT, AND BAC-TERIAL JELLY BUTT

In a Florida test of sprays applied at five day intervals for these diseases, Cox (Continued on Page 111)

TABLE 42 Control of Cucumber Downy Mildew in Florida (12)

Fungicide	Rate/100 gal.	Yield	Exp. Pref.
Manzate	1½ lbs.	1	1
Dithane + ZnSO.	2 qts. + 3/4 lb.	1	2
Dithane + MnSO.	2 qts. + 1 lb.	2	4
Dithane X78	2 lbs.	2	3
CMZ	6 lbs.	3	6
D-14 - captan (alternate)	2 qts. + 3/4 lb., 4 lbs.	2	4
D-14 - Tribasic cu, "	6	2	9

TABLE 40 Mildew Control in Florida on Cantaloupes (11).

Fungicide	Rate/100 gal.	Yield Rating	Exp. Pref
maneb	1.5 lbs.	2	2
maneb 3 Karathane 1*	2 lbs.	4	
maneb 1 + Cop-O-Zinc 2*	3 lbs.	1	
Thioneb	1.5 lbs.	1	4
nabam MnSO,	2 qt1 lb.	1	3
maneb-Kar-Cap**	1.5-41. lb.	2	
streptomycin sulfate	200 ppm	U	
Griscofulvin	200 ppm	U	
maneb-Karathane	1.5-1 lb.	2	1
Cop-O-Zinc	3 lb.	3	

Premixed.
 **Captan added during bloom, 5th appl.; Karathane in last 2 appls.

TABLE 41 Celery Early Blight Control in Florida (11).

Fungicide	Rate	Order of Control	Exp. Pref.
maneb	1.5 lb.	1	2
ziram	2. lbs.	1	1
ferbam	2. lbs.	1	1
dichlone	2. lbs.	3	6
captan*-Li ₂ CO ₃	45. lbs.	3	6
Cop-O-Zinc	4. lbs.	1	1
nabam + MnSO.	2 qt. + 1 lb.	2	5
ziram + ferbam	1 + 1 lb.	2	4
maneb + ferbam	1+1 lb.	1	3

^{*}Captan first six apple. only, then lithium earbonate.

TABLE 43 Anthracnose and Pythium fruit rot of Cucumber (S. Carolina)

	(40)1			
Fungicide	Rate .	Yield Rating	Ea	p Pref.
Dithane Z78	3.9 % zineb	6	2)
Manzate	4.2% maneb	5	1.) dust
Dithane M22	4.2% maneb	4	1)
Tennam	1-100	3	3)
Dithane	2-100	2	2) spray
Manzate	11/2-100	1	1)

TABLE 44
Control of Powdery Mildew of Cucumber in Florida (12).

Fungicide	Wgt./100 gal.	Control Rating	Exper Pref.
Karathane	8 oz.	1	1
Sulfur (wettable)	2 lbs.	1	3
maneb (Manzate)	1.5 lbs.	2	. 2
Griseofulvin, dust	1% dust	4	5
Griseofulvin. spray	500 ppm	3	4
No treatment	**	5	

Fertilizer Views and News

Pin Pointing Fertilizer Recommendations

SOIL analysis is developing to a high degree of efficiency at many agricultural experiment stations. This is a result of experience, better techniques and a system of correlating the chemical test with plot and field tests. One consequence of this development is the manner in which fertilizer recommendations are made: in many cases the farmer is told to use so many pounds per acre of each of the plant nutrients instead of so many pounds per acre of a specified grade of mixed fertilizer. This practice has grown to such an extent in some states as to promote a new group of purveyors of nutrientsthe so-called "blenders."

A blender is a small operator with or without good mixing facilities who is prepared to sell simple fertilizer materials, or to mix the materials at the farmer's request in accordance with the soil analyst's prescription. Because the blender confines his market to a small radius, utilizes low-cost facilities and has only a meager capital investment, he can undersell the old-line established competitor. Since he sells only the raw materials and blends them at the buyer's request he is, technically, free from the necessity of registering the fertilizer grades he blends. This competitive situation is causing serious concern to those who are directly affected.

The question may be asked, is it worth the time and effort of the extension services to prepare and release the usual list of fertilizer grades for different crops based on "averages," that is, average farmer, average

field tests, average pre-acre crop yields on average soil types? "Average fertilizer recommendations fit almost nobody," says Professor Kohlmeyer of Purdue University, and adds, "Farming is becoming such a specialized business that general prescriptions are almost useless." With this observation we are in complete agreement. But we also recognize that under present circumstances it is the best that can be done. Perhaps, some improvement could be made by tailoring them to specific groups. As Dr. George D. Scarseth pointed out recently, "Whom are we trying to reach with these fertilizer recommendations?" The 1954 U.S. farm census shows that a group of 9% of our farmers produces about 51% of the total farm production, 61% of the farmers made only 12% of the production: and a middle group comprising 30% contributed 37% of the total production. It is all too evident that the bottom 61% group cannot be considered economic farming enterprises, and generally this group is not interested in fertilizer recommendations. They are more likely to copy or follow the practice of some neighbor in the top or middle group.

The top 9% group is made up of relatively large farm units having plenty of capital or a good credit rating and considerable managerial skill. This group relies largely on its own knowledge, facilities and resources to devise the plant nutrient requirements of its crops and general fertilizer recommendations are meaningless to it.

There remains the middle, 30% group—which constitutes the core of

American agriculture. This group is more often than not short on working capital and on credit, has farm acreages relatively too small to operate with modern mechanical equipment and is known to give little heed to general fertilizer recommendations. However, this is the group that should be the target for sales and educational programs designed to increase farm profits through the skillful use of commercial fertilizers.

It is an acknowledged fact that despite industry's promotional programs and the long-time educational efforts of state, federal and industry agencies the majority of farmers do not follow the official state fertilizer recommendations. Perhaps it may be advisable to analyze local farmers more efficiently so that the efforts of all the educational agencies can be more effectively pin-pointed on the right targets.

Sulfur-A Neglected Plant Nutrient

7 EGETABLE crops such as cabbage, broccoli, radishes, beans and forage crops such as alfalfa and other legumes usually grown on lighter soils, require generous supplies of nutrient sulfur if they are to produce at profitable levels. Many plants contain in their tissues more sulfur than phosphorus, calcium or magnesium. Sulfur is essential in the building up of protein. Although sulfur is one of the essential elements of plant growth it has not had the attention that is usually accorded the major nutrients, nitrogen, phosphorus and potassium. This is unfortunate. Perhaps, it was felt by those responsible for making recommendations, that most soils contain a sufficient native supply. Furthermore,

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since ordinary superphosphate is applied either directly or indirectly, in the form of mixed fertilizer, it was not generally necessary to apply sulfur: about half the weight of ordinary superphosphates is calcium sulfate, which contains about 12 percent sulfur. This has been more or less the case in the humid areas of the country east of the Mississippi, and so long as the major source of phosphate is the ordinary type, no serious deficiency of sulfur need be expected. The increasing use of triple superphosphate in the manufacture of the higher-analysis mixeJ fertilizers, however, poses a problem. This superphosphate, unlike the ordinary grade, does not carry sulfur in to make up. Its expanding use for direct application and for manufacturing high analysis fertilizer mixtures may create a sulfur deficiency in many light soils, particularly those along the Atlantic and Gulf seaboards.

In the vicinity of industrial areas, especially where bituminous coal is consumed, measurable amounts of sulfur originating in chemical processes or coal combustion are brought down from the atmosphere by rainfall: up to 35 to 50 pounds and more of sulfur per acre per year may thus be added to soils. Muc's of this rainfall sulfur, however, is lost either by leaching or it may accumulate in the lower strata of the subsoil out of reach of young plants or shallow rooted crops.

There is urgent need for a systematic study of the role of sulfur in the soil and in the plant as has been made for phosphorus, potassium and nitrogen. At present, scientific data are insufficient to permit plant physiologists and horticulturists to determine accurately the amounts of sulfur needed by plant species and what happens when deficiencies exist.

The Farmer: Bless Him!

THE spring season gladdens all hearts as it stretches its warm and protecting green mantle over all the earth. That lovely green color is from chlorophyll, the green pigment of all living plants, which cunningly captures the sun's radiant energy to use it for converting car-

bon dioxide and moisture vapor absorbed from the air to sugars, starches and other numerous compounds.

The two most important things in the world are plants and farmers. Why? Because without plants life is inconceivable and without farmers we would have precious little foodstuff to sustain us. So I say, God bless the farmer. He should be proud in knowing that he is a benefactor of mankind. He may have his doubts (as who doesn't) when things go rough and he wonders if the urudgery and poor financial returns justity his calling and whether or not it is all futile. We who are his beneficiaries know differently. Farming does have its satisfaction. The farmer serves with not only the goods he produces but he adds stability with us thinking and hope with the creativeness of his spirit.

Financing Phosphate Fertilization

N another part of this issue appears a digest of an interesting fertility experiment by Dr. C. M. Woodruff of the University of Missouri who presents a novel concept on how to figure the cost of fertilization. Basing his views on a 7-year experiment, this scientist makes the point that the total cost of fertilization should not be borne by the treated crop, but should be shared by succeeding crops which also benefit from the initial application. Emphasizing particularly the nutrient phosphorus, he points out that it is preferable first to raise the soil phosphorus level to a point at which the increase in yield represents a fair return on the cost of the applied fertilizer, and shows how this may be done painlessly, so to speak.

For example, his reasoning is this: To get profitable yields, the soil must be able to deliver an adequate quantity of phosphorus to the crop. The farmer may apply the phosphate all at one time or in annual increments to bring the level of this nutrient up to the desired point to produce a profitable yield. To apply the total requirements at one time may be prohibitive to the average farmer. Most farmers try to get by on a less than adequate quantity. His soil test should give him a good estimate of

the phosphorus status of the soil. He also should have an estimate of what a unit measurement of a crop removes from the soil. He then should apply about twice the amount of phosphorus as will be removed by the expected crop. This will leave behind about half the amount as residual phosphorus available to the succeeding crop. By repeating this procedure in one or two rotations he will have gradually built up the soil phosphorus to a high level and the annually applied increments will maintain this plateau of fertility to produce optimal yields. The cost of each increment of applied fertilizer will be paid for by the extra yields which can be considered as interest on the investment.

Agronomic considerations favor this plan. Dr. Woodruff points cut that the old concept of "phosphorus fixation" by soil agencies is untenable. The residual phosphorus is held by the soil in much the same manner that calcium is held and is utilized by succeeding crops until the supply is diminished. If the supply is not replenished after each harvest the yields will decrease accordingly.

Some authorities still insist that it is not necessary to add phosphorus to a soil if the increase in yield of the fertilized crop will not pay for the cost of the fertilizer. However, and this is stressed by Dr. Woodruff, they do not recognize that the benefits of the phosphate fertilization carry over to succeeding crops. If each increment of applied phosphate is paid for by the extra yield and a net profit is enjoyed at the same time, it makes sense to apply the phosphate in that manner while providing at the same time for a build-up of residual fertility as an extra dividend.

Blossom-End Rot Is Calcium Hunger

A PPLYING lime to a soil is ordinarily considered a means of
correcting soil acidity: to "sweeten"
the soil, is the common lay expression. That lime also provides nutrient calcium and magnesium carbonate is not always appreciated. This
dual role of lime was demonstrated
most strikingly recently in Florida by
Dr. C. M. Geraldson, at the Gulf

(Continued on Page 121)

Arcadian News

Volume 2

For Manufacturers of Mixed Fertilizers

Number 5

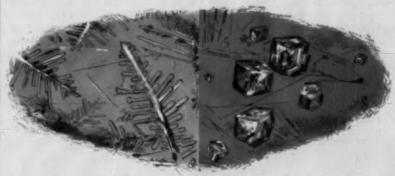
HERE'S HOW URANA HELPS TO PREVENT FERTILIZER CAKING

REACTS IN MIXTURE TO FORM CUBE-LIKE CRYSTALS

In the manufacture of mixed fertilizers, ammonium salts react with potassium chloride to form ammonium chloride crystals. If fertilizer has a tendency to cake at the factory or in the bag, it's often because these microscopic crystals are fern-like or needle-shaped and bind together in the mixture.

More and more fertilizer manufacturers are avoiding this cause of caking, by using URANA Nitrogen Solutions in the ammoniation process. The chemical reaction of these Solutions produces ammonium chloride crystals that are cube-shaped with much less tendency to bind together in the mixture.

When you use URANA Nitrogen Solutions, you get softer set in storage piles, easier, faster handling from bulk to bagging and far less secondary caking in the bag. The result is a better quality, better conditioned fer- in URANA Nitrogen Solutions is ex-



Micrograph of ammonium chloride crystals.

tilizer, and often a reduction in costs.

Five different URANA Nitrogen Solutions are available to fit every ammoniation situation, including the manufacture of high-analysis mixed goods. These Solutions range from 41% to 49% nitrogen in various combinations of ammonia, ammonium nitrate, and urea.

The cost per unit of urea nitrogen

ceptionally low. And, by getting three forms of nitrogen in one easy-handling solution, you give your fertilizer extra plant food value without additional handling and shipping.

Start now to get all the facts on the many advantages of URANA Nitrogen Solutions. Contact Nitrogen Division, Allied Chemical & Dye Corporation, 40 Rector Street, New York 6, N. Y. Phone: Hanover 2-7300.

New Methods of Timing Fertilizer Increase Protein Content of Hay

Grassland fertilization has always been an attractive sales opportunity to the fertilizer manufacturer, however it has been difficult to get farmers to use heavy applications of fertilizers on grass hay and pastures. Recent developments in new methods of fertilizing grass now promise to open up this big market.

These methods, which call for the proper timing of heavy applications of fertilizer in the fall and spring, have resulted in big yields of forage containing 16% to 20% crude protein as well as a high content of total digestible nutrients.

Four Tons of 20% Protein Hay

Heavy application of high-nitrogen fertilizer in the late fall quickly moves plant foods into the roots for use the following spring. Heavy application of nitrogen top-dressing in the late spring, a few weeks before harvest, greatly increases the protein content of the grass. Up to 70% of the nitrogen top-dressing moves directly into the protein of the first cutting of hay. Farmers using these new methods have produced as much as 4.4 tons of grass hay per acre with up to 20% crude protein content.

The high value of this extremely high quality forage makes heavy fertilization highly profitable. Ordinary grass hay yields 1% tons per acre averaging about 8% crude protein or 240 pounds of protein equivalent per acre. When proper fertilization increases the yield to 4 tons of 20% protein hay per acre, or 1,600 pounds of protein equivalent, the farmer gets an extra 1,360 pounds of crude protein from the fertilizer.

The value of this extra protein will pay for a lot of fertilizer. The mixed fertilizer and the nitrogen top-dressing together should supply at least 200 pounds of actual nitrogen per acre with phosphorus and potash to balance. Grass ordinarily needs little potash, but the high-yield, high-protein program calls for plenty of potash to keep stalks stiff to prevent lodging.

Importance of Nitrogen Timing

To get these big yields, it is important to apply a heavy nitrogen top-dressing just as the grass seedheads start to shoot out of the sheaves a few weeks before the first cutting. A cyclone seeder, or even airplane application, does this job well. This nitrogen top-dressing works better if plenty of complete fertilizer has been applied the previous fall to pack the roots full of plant food for early and continued spring growth.

Most of the late spring nitrogen topdressing goes directly into the crop instead of being tied up by soil microbes. It shoots the protein content of the grass up very high. When the hay is cut at the proper early stage for good palatability, the fiber stays low and the protein stays high, and the total yield is also high.

Making Hay Really Pay!

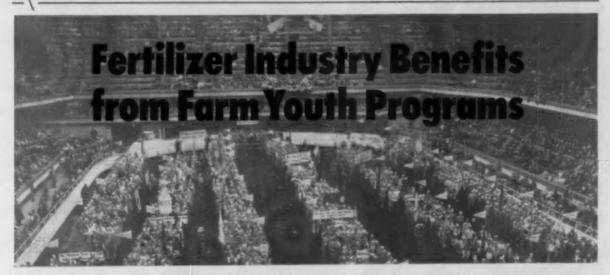
One reason that fertilizing grasslands has been disappointing is the lack of a quick, easy analysis of the feed value of forage. Another reason is the fact that not enough high-nitrogen fertilizer has been used.

For example, when hay gets 100 to 150 pounds of nitrogen per acre, it will produce a higher yield but the protein content may remain low. When 200 pounds of nitrogen per acre is used, the protein content of the hay jumps up, double or more. That's what makes hay really pay!

Farmers producing high-protein hay will usually feed it to their own livestock. If they sell it, a price based on crude protein content makes good sense. One farmer, using a base price of \$25 per ton for 8% protein hay, adds \$1 per ton for each extra 1% of protein above 8%. Thus a 20% protein equivalent hay would sell for \$37 per ton.

You can extend your sales season by using these new facts to sell more fertilizers for grasslands in the late fall and more nitrogen top-dressing for grasslands in the late spring.





IN ADDITION TO ITS EXTENSIVE ACTIVITIES TO EDUCATE FARMERS ON FERTILIZERS NITROGEN DIVISION COOPERATES WITH 4-H CLUB AND F.F.A. FARM YOUTH PROGRAMS

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One of the ways in which Nitrogen Division contributes to agricultural improvement is its cooperation with the 4-H Club and the Future Farmers of America. These young farmers are eager to adopt modern practices to constantly improve their farming skills.

4-H Club Field Crops Program

Nitrogen Division is the donor to the 4-H Field Crops Program, which last year had an enrollment of about 300,000 young farmers. As donor, Nitrogen Division provides six \$400 scholarships to the national winners, allexpense trips to the 4-H Congress to the state and national winners, and a maximum of four gold medals to the winners in each county. In addition, Nitrogen Division helps finance efforts to enroll more members in Field Crops, and has published an attractive Field Crops Manual for use by local club leaders. Nitrogen Division field men call on state 4-H Club offices to offer their assistance in furthering the Field Crops Program.

All of Nitrogen Division's work with 4-H is done in cooperation with the National Committee on Boys and Girls Club Work. This organization, located in Chicago, serves as a liaison agency between donors and the Federal and State Extension Service, which operates the 4-H program.

Participants in the Field Crops Program learn to look on farming as a business. They keep detailed records of expenditures and cultural practices; they run comparison tests; they work always to "make the best better." And when they take over the family farm or go out on their own, you can be sure they will be better farmers for having been enrolled in the 4-H Field Crops Program.

Future Farmers of America

Nitrogen Division also contributes to the Future Farmers of America Foundation. The FFA, a club for boys enrolled in a high school vocational agriculture program, is directed by the Department of Health, Education and Welfare. Many FFA boys already carry on their own independent farming operations.

Fertilizer dealers and manufacturers can help farm youth programs in several ways. Perhaps you have a room that can be used as a club meeting place. You could provide local awards, give educational talks, or sponsor dinners. Probably most welcome of all would be a tour of your plant, or you may have fertilizer field demonstrations which will interest farm youngsters.

Why not talk to your county agent about how you can help with the 4-H Field Crops Program. Or see your high school vo-ag teacher about lending a hand with the work of the Future Farmers.

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2M	44.0	23.8	69.8	-	6.4	1.147	18	26
3	41.0	26.3	55.5	-	18.2	1.079	17	-25
ЗМ	44.0	28.0	60.0	-	12.0	1.083	25	-36
змс	47.0	29.7	64.5	-	5.8	1.089	34	-30
4	37.0	16.6	66.8	-	16.6	1.188	1	56
4M	41.0	19.0	72.5	-	8.5	1.194	7	61
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12	44.4	26.0	50.0	12.0	12.0	1.081	25	- 7
13	49.0	33.0	45.1	13.0	8.9	1.033	51	-17
15	44.0	28.0	40.0	15.0	17.0	1.052	29	1
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WASHINGTON REPORT

By Donald Lerch



POR fertilizer manufacturers—this is it. The race is on to see how many acres farmers really get seeded down during spring planting weather, and how much fertilizer they feed through the hopper. At this writing, there's a feeling of buoyancy here in Washington, and the insiders will tell you they wouldn't be a bit surprised if farmers plant far more then U. S. Department of Agriculture estimates show.

Wet weather in early spring over much of the corn belt and other key farming areas is probably the greatest single force encouraging farmers to plant more and to buy more fertilizer than early predictions showed. About the best news of all is that the wet weather in late-winter and early spring gives rise to the hope that the drought may be ending. Experimental evidence shows that in some midwestern states, wet weather on or around the spring equinox has been associated with a change towards more normal pre-cipitation, three out of four times. This is the result when precipitation is more than 150% of normal . . . such as occurred this year.

On the other hand, very dry weather during this time has been followed by normal or wetter weather in only one-quarter of the instances for which data is available. Another heartening factor is that the above normal precipitation areas are occurring in those sections of the midwest breadbasket normally associated with high crop yields.

All these conclusions are based on experimental data collected by the U. S. Weather Bureau and should be considered as such. Also it is likely there will be some areas of drought remaining. I was in several of the dry areas when the rains came, and it seemed to me that farmer optimism sprang up almost overnight.

Washington expects corn acreage to run slightly under 75 million acres, which would be the smallest in seventy years and 5.3% under 1956, and a whopping 11% below the ten year average. This would be a reduction of 4.2 million acres from last year, but somewhat less than the 5½ million reduction expected by the U. S. Department of Agriculture.

Plantings of oats are expected to be 3% under last year, whereas soybean acreage may be up 3½% from a year ago, and barley up 9%, with the expected 16 million acres running one-third larger then the average.

Biggest jump of any crop is expected

to come in grain sorghums with 26½ million acres indicated, which would be 23% larger than last year, and three-fourths above average. In fact, some Washington scientists are predicting that sorghums are going to sweep the country. If you don't already have your seed—you might as well forget it. Most of the good seed is sold out.

Hearings are due momentarily on the food additive measures pending before Congress. These measures are being studied by the National Agricultural Chemicals Association and pesticide companies. The Food and Drug Administration is anxious for all interested groups to consider the measure thoroughly, before hearings begin, to minimize the areas of differences. We should soon know what position key groups will take.

Fire ants have kindled the imagination of big city editors everywhere, and stories are continuing to appear, according to scores of clips I've just reviewed. Some people call the fire ant a "sleeper"—a pest that stayed within rather small boundaries for many years and then suddenly encompassed many states to the point where it now infests some 20 million acres in five gulf coast states and Georgia.

Congress apparently wants something done about this new problem pest, for the Senate already has passed a bill calling for a program to be developed, and the House is generally in favor of similar action. No money is included in the current crop of bills, rather the aim is to determine how much genuine interest and need there is for an eradication program, and then to design a program which would utilize fully the resources of county and state citizens groups and governments. The federal government would then serve to coordinate the eradication program and, as is usually the case, would provide some of the money. The hope is that much of the action and initiative will come locally. However, the U. S. Department of Agriculture is ready to act promptly, and there may well be large scale action soon.

The great value to the pesticide industry of a sound informational and educational program preceding major spray operations is again being demonstrated in the northeast gypsy moth campaign now underway. Major efforts were made by the U. S. Department of Agriculture and

agricultural colleges to advise farmers and the general public of the nature of the spray program, the reasons for it, the material being used, and the safety of the operation to man, animals, wildlife, and

This reporter attended the regional meeting of the National Association of Television and Radio Farm Directors and the American Association of Agricultural College Editors at which a special presentation was made on the gypsy moth program to make certain that those who regularly reach farmers and the public would have the full story, and would have an opportunity to raise questions. This is just one example of the many parts of the educational program.

Despite all these efforts, however, some letters of criticism are being received by the U. S. Department of Agriculture, and it is likely that other letters have been mailed to the agricultural colleges in the affected areas. Yet, according to latest reports, the number of complaints is small and, for the most part, the nature of the points raised indicates a lack of knowledge of the real nature of the program.

Actually the spray, consisting of one pound of DDT dissolved in one gallon of light oil applied per acre, is harmless. Thus the treated areas in New York, New Jersey, and Pennsylvania should raise no health problems. However, all those in both the industry and government phases of pest control can perform public service by making available information on the spray program so that people will be better informed.

Emery D. Burgess, Director, Plant Pest Control Division of the Agricultural Research Service, and Dr. W. L. Popham, Assistant Administrator of the Agricultural Research Service, are backstopping the program here in Washington. Key men in the field include Harry Smith, Regional Supervisor, Plant Pest Control Division, Box 930, Moorestown, N. J., and Verne O'dell, in charge of field operations, Box 659, Albany, N. Y. State entomologists on the scene may actually have more firsthand information than any one else, and those seeking information could well be referred to them.

Nearly 2½ million gallons of DDT oil mixture is scheduled to be applied by early or mid-June. To be effective, the spray must be applied before the gypsy moth larvae are full grown and stop feeding.

(Continued on Page 108)

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LISTENING POST



This department, which reviews current plant disease and insect control problems, is a regular monthly feature of AGRICULTURAL CHEMICALS. The comments on current plant disease problems are based on observations submitted by collaborators of the Plant Disease Epidemics and Identification Section, Horticultural Crops Research Branch, United States Department of Agriculture, Beltsville, Maryland.

Uniform Rice Seed Treatment Tests in the Southern Rice-Growing States, 1955-56

G. ATKINS of the United States Department of Agriculture Agricultural Research Service, ° E. M. Cralley of the University of Arkansas, and S. J. P. Chilton of the Louisiana Agricultural Experiment Station, report* that rice seed treatment has become standard practice in Arkansas, Louisiana, and Texas within the past 10 years. Certain chemicals have been recommended and used for the control of seedling blight caused by seed or soil-borne fungi because they provide a measure of "stand insurance" at relatively low cost

Seedling blight is caused by several seed and soil-borne fungi that invade the rice seedling before or after emergence from the soil. The principal seed-borne pathogens are Helminthosporium oryzae, Curvularia spp., and Fusarium spp. Rhizoctonia solani, Fusarium spp., and Pythium spp. are the most important soil fungi involved. Other fungi that have been isolated seem to be of little importance as seedling pathogens.

The amount of severity of seedling blight is influenced primarily by soil temperature, i.e., time of seeding, soil moisture, infestation of the seed by fungi, and depth of seeding.

For many years rice farmers have experienced most difficulty with seedling blight early in the season. In rice seed-treatment studies by different workers at various times, the more effective fungicides gave larger stand increases on rice sown early in the season than on rice sown late. Seedling blight has been reported to be more severe at low than at high temperatures in greenhouse tests in which the soil temperature was regulated. At the low temperatures, two of the most important seedling blight organisms, Helminthosporium oryzae and Pythium sp., were isolated more frequently than at high temperatures. Also, at the low temperatures, heavily infested seed produced more diseased seedlings than clean seed. At high soil temperatures, species of

Fusarium were found to be relatively more important.

After reviewing earlier investigations, the authors state that with the introduction of slurry seedtreatment machines and fungicides, rice seed-treatment became essentially a custom operation. The machines are used in conjunction with modern seed-cleaning and grading equipment, and treatment with a fungicide in a relatively large seed-processing plant is standard practice in production of high-quality premium-grade seed rice.

This widespread use of seedtreatment machines, operated by trained personnel following specific recommendations of experiment stations or manufacturers, has largely eliminated the possibility of overdosing the seed. Perhaps as a consequence, certain effective mercury

TABLE 1.

Summary of 1955 and 1956 uniform rice seed treatment tests. Figures represent percentage emergence based on averages of stand counts for the 3 locations.

			1	955			19	956				
Fungicida		ZENITH			BLUEBONNET 50		ZENITH		ENITH BLUEBONNET		Percent Increase	
	Fungicide	Dosage (ez./bu.)	1st See	2nd ding	1st See	2nd ding	1st See	2nd ding	1st See	2nd ding	1955	1956
Arasan SFX	1	62	87	44	65	61	62	44	55	14.7	14.0	
Delsan	1-1/8	71	85	38	66	60	68	41	61	15.6	19.0	
Spergon-SL	1	66	80	42	64	53	62	44	58	11.9	12.4	
Phygon-XL	1	64	81	47	63	54	61	50	56	13.8	14.9	
Dow 9B	1	65	73	42	57	49	55	48	58	11.0	9.9	
Orthocide 75	1	63	83	43	66	53	65	40	52	12.8	8.3	
Captan 75 Yellow	1	62	79	43	67-	53	56	44	56	11.9	8.3	
Cuprocide	1	64	83	40	63	60	68	41	59	11.0	11.6	
Ceresan M	1/2	65	73	43	66	56	60	61	65	10.1	27.6	
Ceresan M-2X	1/4	64	78	44	67	53	52	59	65	12.8	19.0	
Ceresan 200	1/4	-	-	-	-	53	60	60	64	-	22.6	
Agrox	1/2	65	81	46	65	55	61	56	66	14.7	24.0	
Panogen 15	1/2	66	78	46	65	54	62	62	68	13.8	20.7	
MEMA	1/4	67	81	45	68	57	67	56	64	16.5	27.3	
MEMA	1/6	62	83	47	69	60	66	56	65	16.5	28.1	
Control	-	60	70	38	57	50	54	37	52	-	-	

The first seeding was made as early as possible. The second seeding was made 4 to 6 weeks later.

^{*}Atkins, J. G., E. M. Cralley, and S. J. P. Chilton. Uniform rice seed treatment tests in Arkansas. Louisiana and Texas, 1965-56. Plent Dis. Reptr. 41: 105-108. Feb. 1967.

fungicides have been recommended and given satisfaction in recent years.

The 1955-56 Seed Treatment Test: Clean, good-quality seed rice of two representative varieties was used for these tests. The varieties were Zenith, a medium-grain type with pubescent (rough) hulls, and Bluebonnet 50, a long-grain type with smooth hulls. The chemicals tested were, with a few exceptions, current production samples provided for experimental testing.

The tests were sown with smallplot equipment under conditions similar to drill-sown rice. The row length varied, but generally 20-foot rows were used. After the rice seedlings emerged, all plants in each row were counted.

A summary of the tests for 1955 and 1956 is given as Table 1. The results are given as over-all averages for the materials at the dosages tested, instead of as a more detailed listing by locations, years, varieties, and seeding dates. In certain specific tests considerably higher stand increases resulted from the use of a number of materials. For example, in the first seeding of Bluebonnet 50 at Crowley, Louisiana in 1956, stand increases of essentially 100 percent were given by Ceresan M, Ceresan M-2X, Agrox, Panogen 15, MEMA, and Ceresan 200.

In general, each of the fungicides tested increased emergence. However, on the basis of results shown in Table 1, and of an inspection of the data for individual series, certain materials gave higher stand increases more consistently than others.

In 1956 differences were encountered between the two varieties, Zenith and Bluebonnet 50, as to the results obtained from mercurials and non-mercurials. The two groups were essentially equal on Zenith, but the mercurials were markedly superior on Bluebonnet 50. The seed lot of Bluebonnet 50 (from the Beaumont station) was rather heavily infested with Helminthosporium oryzae, whereas the Zenith seed lot (from the Stuttgart station) was not.

Considerable variation in relative performance of the various fungi-(Continued on Page 113)



This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Mr. Dorward is head—Plant Pest Survey Section, Plant Pest Control Branch. U. S. Department of Agriculture. His observations are based on latest reports from collaborators in the U.S.D.A.'s pest surveys throughout the U. S.

By Kelvin Dorward:

Boll Weevil Survival Generally Below 1956

OODS trash examination conducted recently by cooperating Federal and State workers in several states shows in most areas that the number of live weevils that survived the winter is below the number in last year's survival survey. The only two states recording higher counts this year are Georgia and Virginia.

Due to a change in designation in the fall of 1956, not all areas sampled can be compared. Certain areas however can be compared to give an idea of the problem to be expected. Madison Parish, La. has a survival count of 1,937 live boll weevils per acre this spring, compared with a count of 3,654 in the spring of 1956. To caution against complacency though, it should be pointed out that, in the last 21 years, the current count of 1937 has been surpassed in only three previous years; 1950, 1955 and 1956. The average for the four areas examined in the State of Louisiana this spring was 1,175 live weevils per acre, or 67 percent of the number found in hibernation last fall.

Percent survival in Mississippi was considerably lower than in Louisiana. The north delta had the lowest survival, 350 weevils per acre of trash for 14 percent survival. The hill section had the highest rate of survival, 34 percent or 565 weevils per acre. Other areas checked in Mississippi were the lower and central delta sections, with 26 percent survival or 619 weevils per acre and 22 percent or 404 weevils per acre, respectively. In the spring of 1956 the average count for the six delta counties was 1,355 weevils per acre of trash.

Florence County, S. C. recorded a survival count of 1,236 weevils per acre of trash as compared with 4,646 in the spring of 1956. The percent survival was 21 which was the lowest percent survival on record. The number of surviving weevils was the lowest except for 1940, 1944 and 1956, since spring hibernation surveys were started in the county.

Although the percent survival in southeastern 'Virginia was only 29, the number of live weevils found this spring was 1,210 per acre of trash. Last spring the counties of southeastern Virginia had an average of 85 surviving weevils per acre.

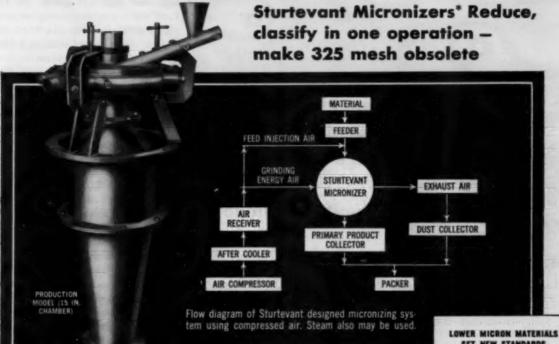
Georgia recorded the largest average number of weevils surviving the winter since the spring of 1953. The average number of live boll weevils found this spring in Georgia was 1,036 per acre of surface trash. This was 54 percent survival and compares with a count of 390 live weevils in the spring of 1956. Twenty-nine of the 50 fields examined were found infested. The maximum number of live weevils found per acre was 13,068.

At Waco, Texas where boll weevils are collected in the fall and placed in cages located in a wood lot, winter survival observations were begun in March. Five hundred weevils were placed in each of 10 cages and activity in March 1957 was 4.2 weevils per inspection. Weather during the 1956-57 winter was mild and survival might be expected to be comparable with that of 1954, 1953. 1952, 1950, 1946, 1945 and 1944 but probably less than that of 1955 and 1941 when survival was extremely high. Weevils which entered hibernation last fall were fewer in number, however, than normal for the area, as conditions were unfavorable for heavy late season build-up.

Other Cotton Insects

Inspections to determine the survival of pink bollworms were

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conducted in several areas during March. In the Southern area of Texas inspection of surface debris showed a much lower number of live pink bollworms than last spring. In El Paso, where economic damage occurred in 1956, mortality was found to be high. Inspection of standing stalks and surface debris in the eastern part of the Lubbock district and in the San Angelo district, both in west Texas, showed considerable numbers survived the winter. Limited inspection in Cottle County, Texas indicated that large numbers of the pest were in hibernation. Stalks and debris were inspected in 16 Oklahoma counties on 162 fields. Twenty infested bolls from standing stalks and four from surface debris showed six live and 23 dead larvae from the standing and one live and three dead larvae from

Cage studies to determine cotton fleahopper survival are made annually at Waco, Texas. Emergence in March 1957 was considerably greater for the same period than in any year since 1948 except 1953 when 7,269 fleahoppers emerged compared with 7,848 this year for the same period. Survival for this year is expected to be high, but fortunately migration to cotton is expected to be during the time when early-season insecticide applirations are made in the area.

the surface debris bolls.

Aphids and bollworms had caused the most damage to cotton of any cotton pests in the Lower Rio Grande Valley of Texas. The aphid infestation was mostly along the river in the eastern area. Thrips control was required in a few cotton fields. Some cutworm and darkling beetle damage to young cotton was reported from the Mission, Texas section. Cutworm damage to young cotton ranged from light to severe in Zavala County, Texas.

Fruit Insects

BY the latter part of March aphid hatch had been reported from several widely separated states. Hatching was reported as early as March 15 in Jefferson and Berkeley Counties, W. Va. First aphid eggs hatched in opening apple buds at Centralia, Ill., March 19. In the Vincennes, Ind., area overwintering eggs were

more abundant than usual and by late March some hatching and feeding was underway. Hatching was also underway in apple orchards in Virginia, Maryland, Delaware and Pennsylvania. In Orange County, N. Y. hatching of the apple aphid was observed April 1.

Pear psylla egg laying was observed in the Wenatchee, Wash. area March 19. In Jackson County, Ore. eggs were observed hatching March 20. Pear thrips reached height of emergence in mid-March in the Forest Grove, Ore. area in the Willamette Valley during the week of March 24-30 and began to appear in Benton County, March 25. The pest was slightly more abundant than in 1956.

The first red-banded leaf roller egg mass of the season in the Vincennes. Ind. area was found March 25. Plum curculio eggs were found in little peaches in a Fort Valley, Ga. orchard March 20.

In late March, European red mite eggs were numerous on apple in Jefferson and Berkeley Counties, W. Va. Carry-over in orchards of Niagara County, N. Y. appeared heavier than normal.

Cereal and Forage Insects

MONG the cereal and forage in-A sects the pea aphid which was very prominent last year is again becoming active. In the Yuma, Ariz. area during early April the pea aphid was more numerous than the spotted alfalfa aphid in several fields. Some reduction in growth was noted. Pea aphids were present in legumes over the State of Louisiana, with rapid increase noted in the northwest and northeastern areas. The insect was reported present in southern Missouri, but hard rains had reduced populations. Maryland, Virginia, Delaware, Georgia, Texas and Kansas also reported the pest present in varying degrees.

Both the alfalfa weevil and clover leaf weevil were becoming active during late March and early April. The alfalfa weevil was reported for the first time from several North Carolina Counties. The pest is now known to be to the South Carolina border. (Continued on Page 106)

CHEMISTRY at work case: How to cut costs with Attaclay as one carrier and diluent for all production attaclay V Dust Bases V Wettable Powders Finished Dusts Carrier And Diluent Report: Pesticide processors-with product lines that range up to sixty and more mixtures—m substantial savings through across-the-board use of Attaclay as carrier and diluent. This "one-material plan" cuts costs in many obvious (and some less obvious) areas (1) Attaclay works well with all of the popular poisons . . . helps turn out premium products. (2) Its great sorptivity shortens cycle times . . . cuts "clean-out" down-time in mills, impregnators, mixers. (3) Permits greatly simplified inventory. (4) Scheduling and procurement problems eliminated. (5) In-plant carrier and diluent handling costs minimized. (6) Less chance of error in formulation. Our business is to supply low-cost, nature-given products that make things go smoothly in your plant . . . well in your markets. Use the coupon. MINERALS & CHEMICALS CORPORATION OF AMERICA For more data, see 479 Essex Turnpike, Menio Park, N.J. Chemical Materials I'm interested in a natural mineral product for Catalog Pages 330-334 Send: Detailed "agchem" literature Free samples



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CORPORATION OF AMERICA 479 Essex Turnpike, Menlo Park, N.J.

Leaders in creative use of non-metallic minerals ATTAPULGITE (Attapulgus) ACTIVATED BAUXITE (Porocel) KAOLIN (Edgar . ASPs) LIMESTONE (Chemstone) SPEEDI-DRI FLOOR ABSORBENTS



Makes Plants Grow Faster and Bigger Than Ever Before Possible

RESULTS SHOWN IN RESPONSIVE ORNAMENTALS, TREES, TURF, FOOD AND FEED CROP PLANTS

- Plants grow faster, mature earlier—those requiring "long-days" for blooming, flower early.
- 2. Size and bulk are greatly increased.
- 3. Blooms are heavier, and yields are higher.
- Grasses grow faster, more luxuriantly than with fertilizer alone.
- Flowering time is advanced—certain biennials bloom in the first year, some annuals bloom as much as five weeks earlier.
- Seeds are produced earlier, in as little time as six months in such plants as carrots and head lettuce.
- Dormancy is broken. The requirements for rest period, cold treatment, or variable day length are often by-passed completely.
- 8. Plants are not set back after transplanting.
- 9. Fruit set is improved.

GIBREL is the first of the gibberellins to be produced on a commercial scale. It is ready for immediate use in your formulations. Completely unrelated to fertilizers or nutrients, this Merck-developed gibberellin salt is making headlines with its indicated uses in flowers, ornamentals, turf grasses, and trees. Extensive tests indicate phenomenal results in food and forage crops. Chronic toxicity studies, however, have not yet been completed. Therefore, recommendations for use on such crops must await final results of these tests.

GIBREL for Higher Profits

You can start building profits right now with products containing GIBREL. And you can count on Merck—the first basic producer of a practical gibberellin—to assist you with technical and marketing problems.

GIBREL Heavily Advertised

Merck promotion is pre-selling GIBREL to your customers through a heavy national advertising and promotion campaign. In addition, Merck research is continuing its program to get additional uses for GIBREL. As always, Merck technical service is prepared to aid you in developing your new product, or in adding GIBREL as an ingredient to your present formulation.

GIBREL Easily Formulated

You may use GIBREL in aerosols, powders, and other dry formulations. GIBREL may be present as the only active ingredient or combined with soluble nutrients. Dry GIBREL is stable, readily soluble in cold water, and noncorrosive.

GIBREL Now Ready for Shipment

Merck supplies GIBREL in $\frac{1}{4}$ and $\frac{1}{2}$ lb. containers, and as a 10 per cent pre-mix in $\frac{2}{4}$ and 5 lb. containers. For technical data, prices, or samples of GIBREL, call, wire, or write—

Merck & Co., Inc., Chemical Division, Rahway, N. J.

*GIBREL is the trademark of Merck & Co., Inc. for its plant growth substance.

GIBREL®-a product of MERCK



TECHNICAL SECTION



A Variable Dosage Sprayer For Agricultural Experiments

HE present method for testing in the field the toxicity and selectivity of herbicides or other spray chemicals necessitates spraying a number of separate plots with different dosages. Valuable time is wasted in making up solutions and emptying the spraying machine between operations. The time required is longer the closer the gradations of dosage which it is considered necessary to examine. A machine developed by Fisons Pest Control, Ltd., England, makes it possible with one filling to spray continuously decreasing concentrations, starting from an arbitrary upper limit. A whole spectrum of results is thus made available for examination in far less time than is consumed in getting less complete results by the established method. The unit is known as the Chesterfield Logarithmic Spraying Machine.

The dilution principle used is to pump liquid to the spray nozzles from an intermediate vessel which is otherwise closed except for a lead tube from a water-supply vessel. An efficient agitator is employed and initially the system is completely filled. As spray liquid is withdrawn it is replaced by water and the concentration falls in an exponential manner. A coarsely porous plug in the entrance tube of the mixing vessel prevents adventitious dilution. The nozzles are carefully selected to have equal output at a given pressure, and are fed by separate narrow polythene tubes of equal length from a common manifold as close as possible to the pump, so that the same concentration reaches all nozzles simultaneously.

The pump is directly geared to the tractor on which the machine is mounted, and therefore the concentration taken into the pump is an exponential function of distance along the plot. Since it is necessary for air to be expelled from the spray system before the plot is reached, the simple principle above described is modified by providing also a direct tube from the water tank to a threebranch cock immediately above the pump. The tractor is driven towards the plot spraying water only, pumped through this line. The cock is then quickly thrown over and spraying of chemical commences. Owing to residual water in the pump and manifold, the concentration at the spray nozzles, after clearance of the tubes to the nozzles, rises steeply to a concentration somewhat less than that initially charged, before decreasing along the remaining length of the plot in an approximately exponential manner. The concentration is uniform across the plot. The form of the curve can be worked out theoretically from the volumes; but results are based on experimental calibration. The experimental curve is very accurately constant over the range of speed of a tractor working in one gear. Since the machine is effectively self-washing, repeated sprayings with the same or different chemicals can be made very rapidly.

The machine has enabled the expected advantages of speed and continuity to be obtained, and in addition provides a means of obtaining a rapid estimation of selectivity, and the dosage ratio for limiting cropdamage and limiting weed-kill. Changes in apparent effect with time are also easily observed. By filling throughout with the same spray liquid, the machine can be used for normal spraying. It is also possible to use the machine for examining the effect of admixture of herbicides or for example, wetting agents in continuously varying ratio. The exponential form for one concentration or ratio is not, however, the most satisfactory for this application, and a modified machine, using two mixing tanks in series, which gives a sigmoid concentration-distance curve, is to be preferred.



The Chesterford Logarithmic Sprayer Mark III, developed for experimental use.



Diamond dependable performance pays off in better corn

Research is the key to DIAMOND's leadership in pesticides. As evidence of our belief in the future of agricultural chemicals, our research facilities are again being enlarged. Formulators seeking development co-operation are urged to consult our technical staff. Just write DIAMOND ALKALI COMPANY, 300 Union Commerce Building, Cleveland 14, Ohio.



DIAMOND INSECTICIDES AND HERBICIDES

- For corn-Diamond Grain Fumigants
- DDT
- MITICIDE K-101 (Ovex)
- BHC
- 2,4-D Weed Killers
- LINDANE
- 2,4,5-T Brush Killers
- Wettable powders, dust concentrates, emulsifiable concentrates and oil solutions based on our technical grade chemicals.

"Hercules 528" Pesticide

A pesticide, which in three years of extensive tests has proved to be extremely effective in controlling a wide range of crop pests and has unusually long-lasting effectiveness, will be made available commercially to some of the nation's farmers this year by the Hercules Powder Co., Wilmington, Del.

Hercules originally planned to call the pesticide "Navadel," but, because of a conflict with a product of a similar name, Hercules has abandoned plans to call it "Navadel" and are calling it "Hercules 528." The chemical is already recommended by various state authorities for use on cotton. Tests indicate that it will be useful on citrus and deciduous fruits, grapes, vegetables, and ornamentals. It has also been effective in controlling cattle ticks.

Some of the pests it effectively controls are; leafhoppers, thrips, leaf miners, and mites of various types. Depending on the type of insect, and whether dusts or sprays are used, it is effective in a range of from one-quarter to one-half pound of actual material per acre.

Spray Against Gloeosporium

A further account of tests conducted over the past three years on control of gloeosporium rots in stored fruit has been published in *The Grower*, a London publication.

Supervised by D. Hunnam,

R. M. Foulds, and E. Roney of Murphy Chemical Co., Ltd., Wheathampstead, Herts, England, the trials indicate that, where gloeosporium infection is high, captan should be used for scab control, at least from full bloom onward. A continuous cover should be maintained on the fruit up to three weeks before picking.

Where infection is not high but does warrant spraying, captan should be used from full bloom to mid-July.

Seek Better Fruit Sprays

Despite the fact that fruit growers are using spray materials that keep apple scab under satisfactory control, the search for better fungicides continues. This is especially true for nonmercurial, eradicative materials, according to Dr. Michael Szkolnik, plant disease specialist at Cornell University's New York State Agricultural Experiment Station in Geneva, N.Y.

Scab is the most prevalent and destructive disease of apples, but growers are getting satisfactory control with protective sprays. Dr. Szkolnik says that there is a decided advantage, however, in having sprays that will eradicate scab once infection has taken place.

The principal aim of the search is the discovery of some fairly potent, nonmercurial, eradicative fungicide that can be used for scab control with the least possible injury to the greatest number of apple varieties.

N.P.F.I. Soil

Testing Tube

Frank Stancil, left, of Oconee County, of Oconee County, Ga., and A. S. Giles use one of the soil tubes which the National Plant Food Institute, Washington, D. C., has furnished each county agent in Georgia. The tubes are augmenting the drive by the Georgia Extension Service and the Georgia Bankers Association to establish soil testing as a basis for adequate fertilization.

Rootworm Control Tests

Experiments, conducted to evaluate reduced dosages of aldrin and heptachlor when used against the northern corn rootworm, have indicated that the two insecticides are equally effective in reducing plant lodging and increasing yields when used at the recommended rate of one pound per acre in broadcast treatments and 0.5 pound per acre in starter fertilizer.

Heptachlor, however, produced better results than aldrin when dosage rates in each method of application were reduced one-half.

As broadcast treatments, chlordane, gamma isomer of BHC, and endrin proved to be equal to the one pound rate of aldrin and heptachlor. Chlordane at one pound per acre in starter-fertilizer was found to be as effective as 0.5 pound of aldrin or heptachlor.

Two methods of insecticidal application were employed for the tests. Broadcast treatments were made to small replicated plots while starter-fertilizers containing insecticides were applied to entire rows with conventional four-row planters.

Reduced Dosages of Insecticides for Corn Rootworm Control by J. W. Apple. Journal of Economic Entomology 50, No. 1, pp. 28 - 30.

European Red Mite Control

Results of tests conducted by the California Agricultural Experiment Station, University of California, Berkeley, indicate that good control of European red mites can be obtained with new acaricides but some resistance indicates future prebloom treatments may not be feasible.

Genite-923, Mitox, and Trithion as cluster bud sprays held the mites in check until July, and there was little difference between the plot sprayed with Genite-923 alone and the one which received dormant oil followed by Genite-923.

In one San Jose orchard, however, a definite resistance to Ovotran following foliage treatments was reported; also, a small plot of prebloom Genite-923 failed to give adequate control.



NEWS about the TRADE

CSC Names Howell Consultant

Joseph A. Howell has been retained by Commercial Solvents Corp., New York, as a consultant in the field of agricultural chemicals. Mr. Howell will serve in an advisory capacity on a part time basis to the company's management and to its agricultural chemicals marketing organization.

Mr. Howell draws on 35 years of experience in the fertilizer and plant foods industry. He was the first president of the National Plant Foods Institute when that organization was formed two years ago as a consolidation of the National Fertilizer Association and the American Plant Food Council.

Garden Center Opens In N. J.

Arcadian Gardens, a self-service gardening center, became the first store in the huge Garden State Plaza at Paramus, N. J., to open its doors last month. The plaza, built around a new branch of Bamberger's is scheduled to open this month.

The Arcadian Gardens is located in three buildings with more than 41,000 square feet of selling space. In addition to the central flower and gardening building, the center has a greenhouse and an aluminum lathe house for nursery stock and is air conditioned and humidity controlled.

C & I Drops Merger Plans

The Chemical and Industrial Corp., Cincinnati, has announced that the tentative plans for a merger with the Clopay Corp., which had been reported in the press, have been dropped and that negotiations in connection with the merger have definitely been terminated.

C & I will continue its normal business of designing and constructing

plants for the production of nitric acid, phosphoric acid, sulfuric acid, and the further processing of anhydrous ammonia.

CVPFA Meeting May 13-15

The annual spring meeting of the Carolinas-Virginia Pesticide Formulators Association will be held May 13th and 14th at the Cavalier Hotel, Virginia Beach, Va.

Myron Maxwell, president of the association, will open the May 14th session, and introduce J. E. Keener. CPA, who will give an address on "Accounting—the Language of Business."

Highlighting the meeting will be a round table discussion of problems of the industry, followed by addresses by E. D. Bottom, Universal Tractor Co., and Maury Hubbard, Virginia Farm Bureau Federation.

Colloidal Appoints Strew



Stanley W. Strew has been appointed sales manager for Colloidal Products Corporation of San Francisco, Calif. He was formerly district manager for Chipman Chemical Company.

With the opening of Colloidal's new research laboratory and manufacturing plant at Sausalito, California, they will be in an excellent position to serve the agricultural chemical industry. The increased interest and demand for spray adjuvants has necessitated Colloidal's expansion of facilities and personnel.

Geigy Simazin Approved

The Geigy Agricultural Chemicals division of Geigy Chemical Corp., Ardsley, N.Y., has announced that claims have been accepted by the United States Department of Agriculture for the use of Geigy Simazin for general weed control on non-cropped land.

National Plant Food Institute Announces June Program

M ORE than 1,000 representatives of the fertilizer industry and agricultural leaders will attend the annual meeting of the National Plant Food Institute at The Greenbrier, White Sulphur Springs, W. Va., June 9-12, 1957.

Senator Karl E. Mundt (R-S-D.), member of the Senate Committee on Agriculture and Forestry, will be the principal speaker at the general session on Tuesday, June 11. C. T. Prindeville, Chicago NPFI president, will preside at the two general sessions, June 10 and 11.

A panel discussion on "How Big is the Fertilizer Market?" with O. E. Anderson, Secretary, Ohio Bankers Association, as moderator, features the program on Monday, June 10. Panel speakers will be E. T. York, American Potash Institute, who will discuss the subject "From the Soil and Crop Standpoint"; Wilbur Renk, Wisconsin farmer, speaking "From the Farmer's Standpoint"; Gordon B. Nance, University of Missouri, Columbia, speaking "From the Economic Standpoint"; Mr. Anderson, "From the Bankers' Standpoint."

Russell Coleman, executive vicepresident, NPFI, will follow the panel presentation, with a discussion on "How Can Industry Expand the Market?"

The Institute's Research and Education Committee will meet in the afternoon. The Committee or usists of the following three divisions: Agronomy and Horticulture, Fertilizer Technology, and Economics and Farm Management.

HEPTACHLOR CONTROLS FORAGE INSECTS WITHOUT CONTAMINATING MILK!

This year, Heptachlor will be used more extensively than ever for forage insect control, because Heptachlor provides effective control of forage insects without contaminating milk. Tolerance for the use of Heptachlor on forage crops has been established under the Miller Bill, and confirmed by extensive tests. Among these tests was a special study made by the USDA, in which dairy cattle were fed alfalfa treated with Heptachlor at recommended dosages. Chemical analysis showed no trace of Heptachlor in milk from the test cattle. Because Heptachlor is such an effective insecticide, minimum amounts have residual effectiveness, and yet are safe for use on crops fed to animals.

HEPTACHLOR KILLS THESE FORAGE INSECTS AND MANY OTHERS!

Grasshoppers, alfalfa weevils, spittlebugs, leafhoppers, sweet clover weevils, cutworms, lygus bugs, armyworms, harvester ants, plant bugs, Egyptian alfalfa weevils.

MORE HEPTACHLOR SALES PROMOTION

Heptachlor sales promotion will be bigger than ever before, too! There will be more farm paper and newspaper advertising, more dealer promotional material, more direct mail, literature, and publicity.

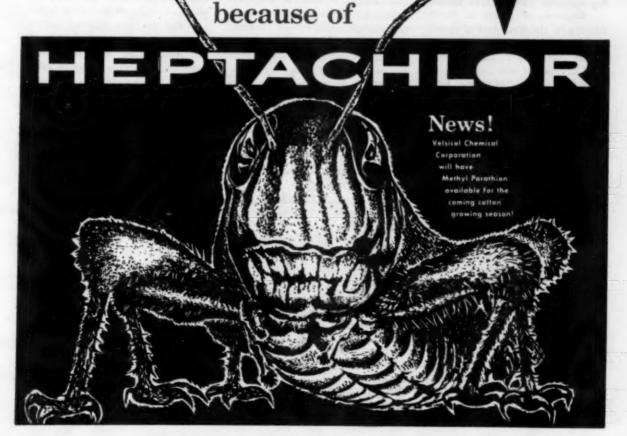
HEPTACHLOR FORMULATORS!

Mail coupon new for samples of Heptachlar materials to be used in Forage Insect Premational

VELSICOL

CHEMICAL CORPORATION AC-57
330 East Grand Avanue
Chicago 11, Illinois
Piease send samples of 1957 Heptachier Forage Insect
promotion materials.

there's a hard year ahead for hungry forage insects...



USDA Wars On Gypsy Moth

The U.S. Department of Agriculture has started a Federal-state cooperative program to eradicate the gypsy moth from almost three million acres of forest land in parts of New York, New Jersey, and Pennsylvania.

The insecticide is being applied at the rate of one pound in one gallon of light oil to each acre treated. Treatments began in mid-April. Area-wise, this is the largest single aerial spraying job ever conducted in the U.S. and will consume more than half of the \$5 million which has been appropriated for gypsy moth control in the nine northeastern states during the current season.

The program calls for eventual complete eradication of the gypsy moth. Since a single DDT treatment is expected to be adequate for a given area, next year's main spraying will be done in an area north and east of this year's operation.

Agricultural Potash Use Down

Deliveries of potsh in North America by the seven leading American potsh producers and the importers during 1956 amounted to 3,932,527 tons of salts containing an equivalent of 2,307,961 tons K₂O, according to the American Potsh Institute. This was an increase of 103,370 tons K₂O or less than 5% over 1955. Deliveries for agricultural purposes in the continental United States for 1950 were 1,872,704 tons K₂O, a decrease of 5,885 tons under 1955.

Agricultural potash accounted for nearly 95% of deliveries. Muriate of potash continued to be by far the most popular material, comprising over 92% of the total K₂O delivered for agricultural purposes, and sulphate of potash and sulphate of potash magnesia nearly 8%.

In addition to the regularly reported deliveries on the quarterly basis, information from governmental and other sources indicates that during the second half of 1956 there were additional imports of European potash into the United States, Canada, Cuba, and Puerto Rico of 98,

753 tons K_0O as muriate of potash and 23,950 tons K_0O as sulphate of potash. These figures are included in the deliveries for the fourth quarter

D-K Appoints Iliff

James E. Iliff has been appointed vice president general manager of Davidson-Kennedy Associates Co., and will direct the Chicago office of the engineer-contractor firm. Mr. Iliff was formerly with Blaw Knox Co.

Davidson-Kennedy specializes in designing, procuring equipment, and erecting chemical process plants and facilities.

St. Regis Names Adams

William R. Adams, former vice president in charge of manufacturing, has been named president of St. Regis Paper Co., New York. Mr. Adams succeeded Roy K. Ferguson, who remains as chairman of the board and chief executive officer.

In a series of other top executive changes, Edward R. Gay was advanced from the position of executive vice president to vice chairman of the board. Arch Carswell and Benton R. Cancell were elected executive vice presidents.

Mr. Carswell, who has been sales vice president since 1953, is continuing to direct sales in his new position.

NPFI Opposes 5.11

John D. Conner, general counsel for the National Plant Food Institute, Washington, D. C., testified late in March before the Antitrust and Monopoly Subcommittee of the Senate Committee on the Judiciary in opposition to the enactment of S.11 and said that "there are no practices presently used in the distribution of fertilizer which warrant the passage of the proposed legislation," and emphasized that there is no justification for this Congress to now deprive a seller of the "vital right to meet competition or to so severely restrict it that it loses its significance."

Mr. Conner said that S.11, a bill to amend the Robinson-Patman Act, in effect, would severely restrict Glenn Names Dworkin



Z. Z. Dworkin has been named manager of sales for the newly organized Glenn Chemical Co. in Chicago, manufacturers of a new chemical insect repellent trademarked "Tabutrex".

Mr. Dworkin had formerly been an area sales supervisor for the Fairfield Chemical division of Food Machinery and Chemical Corp.

Plan Western Cotton Conf.

The 1958 Western Cotton Production Conference will be held March 4 and 5 at Hotel Cortez in El Paso, Tex. It will be the seventh annual conference devoted to problems of cotton production in the Western states.

Guano Plant Hit By Fire

Wind-swept flames raced through the F. S. Royster Guano Co. plant in South Norfolk, Va., last month, leaving a \$500,000 toll in their wake.

Nine firemen were felled by nitrate of soda fumes and one plant workman was hurt by falling debris.

The fire was confined to the landward part of the plant and did not threaten the waterfront docks over which fertilizer materials move ships in the importing trade. Quick work by firemen was credited with confining the blaze to a warehouse.

the right of a manufacturer to meet an equally low price of a competitor.

"The proposed legislation would jeopardize some of the present marketing practices upon which the sale of fertilizer and fertilizer materials are dependent," Mr. Conner said.

"There has never been a proceeding in the fertilizer industry based upon a violation of the Robinson-Patman Act, in so far as we have been able to determine. We know of no facts to support an inference that there are at present predatory competitive practices which are being masked by the 'right to meet competition' proviso. To the contrary, we believe this right to meet competition gives to the fertilizer manufacturer the right to compete for the



Africa

It's a fact Insects are not resistant to Pyrethrum

PYRETHRUM (P.Y.R.), harmless to human and animal life, is

Unsurpassed in Quick Knock-Down

Economy in Concentration With Synergists

Rapid Dispersal High Penetration

PYRETHRUM (P.Y.R.) offers highest protection for



Tobacco Storage



Home Aerosols and Sprays



Poultry Houses







Granaries and Flour Mills

Always insist upon Pyrethrum (P.Y.R.) Base Insecticides

"Have you seen Pyrethrum Facts for 1957?"

TO: AFRICAN PYRETHRUM DEVELOPMENT, INC. 65 Pine Street, New York 5, N.Y.

Please send me_copies of free booklet, Pyrethrum Facts.

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AFRICAN PYRETHRUM

market in the largest geographical area within which he can market and

make a profit.

"On the other hand, there are sound reasons for feeling that the farmer has been the beneficiary of the present vigorous competition under which fertilizer is sold. The price of fertilizer has advanced less than that of any other commodity bought by the farmer. Fertilizer prices are now only 150 per cent of what they were during the 1908-14 base period as compared with 290 per cent of the base period for other commodities purchased by farmers."

Mr. Conner testified further that:

This right to meet competition is an integral part of the marketing of fertilizers. It is essential that it remain a part of this system, particularly because of the changing conditions resulting from the soil bank program. There is no evidence of its misuse in the fertilizer industry. If it should be, there are believed to be adequate means under the present Robinson-Patman Act to correct any such misuse. On the other hand, there are sound reasons for feeling that the proposed legislation would jeopardize some of the present practices which are a vital part of our distribution system."

Anhydrous Ammonia Sales Up

Early reports on 1957 distribution of anhydrous ammonia indicated that sales were running as high as thirty per cent above the same period a year ago. The optimistic reports involved such states as Texas, California, Louisiana, Mississippi, Arkansas, Missouri, Illinois, and Georgia.

Co-op Fertilizer Plant

Central Farmers Fertilizer Co., Chicago, has awarded the construction contract for a phosphate fertilizer plant to be built near Georgetown, Idaho. Actual construction is expected to begin in the immediate future, according to Joseph J. Lanter, president of Central.

The completed project will include mining of phosphate ores on the company's property near Georgetown. Union Bag Appoints Dipman



Union Bag—Camp Paper Corp. New York, has announced the appointment of William W. Dipman as director of market research and development. At the time of his appointment, Mr. Dipman was as-

sistant to the vice president in charge of bag sales.

Montrose Marketing DET

Montrose Chemical Co., Newark, N.J., is offering a new allpurpose insect repellent material, Diethyl Toluamide (DET) which has recently been released for commercial use by the Department of Agriculture.

Montrose is offering a high concentration meta isomer of DET to formulators of insect repellent lotions and similar preparations. The meta isomer was shown in the government tests to be most resistant to "wipe-off" and gives longer protection than other isomers of DET. Sales agent for Montrose Chemical Co. is R. W. Greeff & Co., New York.

Escambia Research Center

Construction of a research center at Wilton, Connecticut, by Escambia Chemical Corp. is now underway, according to Dr. Nat C. Robertson, vice president and director of research.

Thie new center, a 50,000 square foot building on a 46-acre site, will provide for research and development activities and customer and technical service laboratories of Escambia.

Dr. Robertson will be in charge of the center. He will be assisted with the business affairs by Robert G. Reed of Auburndale, Mass., as business manager.

Randox Vegadex, Herbicides

Weed control "twice as good as hand hoeing" has been reported from Florida in the first commercial results obtained this year with two new chemicals which kill grassy weeds before they sprout in field and horticultural crops. Trademarked Randox and Vegadex, the compounds are being offered nationally this year by

Monsanto Chemical Company for preemergence use on a wide variety of crops.

In addition to use on celery, the U. S. Department of Agriculture has cleared Vegadex for greens such as kale, spinach, mustard and turnips; the cole crops which include broccoli, brussels sprouts, cabbage and cauliflower; soybeans, snap and lima beans, beets, lettuce, field and sweet corn and several varieties of nursery stock. Randox has been cleared for use on all varieties of corn as well as soybeans, snap and lima beans, seeded onions and canning peas.

Co-ops In Plant Merger

The Missouri Farmers Association and the Consumers Cooperative Association of Kansas City have announced the formation of a new corporation, the Farmers Chemical Co. The company will operate the fertilizer manufacturing plant built by the Missouri Farmers Assn. at Joplin in 1954.

MFA owns 60 per cent of the stock in the plant and CCA owns the remaining 40 per cent. F. V. Heinkel is president of the new company. Vice president is Howard A. Cowden and secretary-treasurer is R. J. Rosier. Walter Horn continues as manager of the plant and no changes in personnel are contemplated.

Balloon Helps Battle Bugs

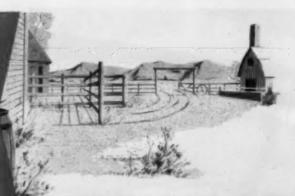
British agricultural experts at the agricultural research station in Roth-ampsted, Hertfordshire, are launching a balloon trailing an insect trap to sample insect populations at various levels.

The experiments are conducted to find out how weather conditions cause insects to be deposited on crops and how such conditions affect the rise and fall in insect counts.

Stauffer Apoints Two

Philip H. McLaughlin has been appointed manager of sales administration at the New York office and Martin P. Kerins has been named sales manager, industrial national accounts for the Stauffer Chemical Co., New York.







UREABOR®

Nonselective. A granular complex of sodium borate and substituted urea... dust-free...for DRY application. Low rates of application are a big feature. The PCB Spreader applies the low rates to best advantage and is available for \$10.75 delivered anywhere in U.S.A.



DB® Granular

A scientifically balanced formulation of 2,4-D and sodium borates...for DRY application, Kills deep-rooted noxious weeds—perennials and annuals—effectively and economically. The recommended low rates can be applied best with the special hand operated PCB Spreader.

(Not intended far control of grass)



POLYBOR-CHLORATE®

A highly soluble powder for spray or dry application. Its double action quickly destroys vegetation on contact and through root absorption. Provides long residual effects. This is a general nonselective herbicide for controlling all types of vegetation.



Concentrated BORASCU®

A granular concentrated sedium borate ore for nonselective control of weeds and grasses. It is easily applied, by hand or with mechanical spreaders, in its dry form. Long residual action is a feature—may prevent regrowth for a year or more.

Whether you are concerned with Agriculture or with

Industry...you need BORATE WEED KILLERS

Weeds incur danger and great economic losses... they steal from crops... they constitute a fire hazard without equal. Nonselective BORATE weed killers attack this menace most effectively by destroying roots and rhizomes and preventing regrowth for long periods. During our lengthy experience with borates for weed control, we have developed special weed killers capable of destroying all types of weeds and grasses under the many various local and regional conditions.

YOU GET ALL THESE FEATURES:

- NONSELECTIVE HERBICIDAL ACTION
- . RESULTS THAT ARE LONG-LASTING
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Summary of Agricultural Chemical Reports at ACS Meeting

DISCUSSIONS on pesticide formulations, ammonia fumigation, new chemicals and toxicity hazards highlighted the agricultural chemicals reports at the 131st national meeting of the American Chemical Society held April 7-12 in Miami, Florida.

The following review some of the reports interesting the agricultural chemicals industry.

Bernard E. Conley, American Medical Association, Chicago, discussed the contribution of pesticides to accidental poisoning and said, pesticides cause about 10% of the accidental injuries by packaged chemicals. A detailed study of death certificates for the postwar decade (1946 to 1954) reveals that pesticides cause from 100 to 150 deaths annually associated with solid and liquid substances. Regional studies of non-fatal poisonings indicate that pesticide products produce generally the same incidence of injury in nonfarm areas.

Attention is drawn to the rather large number of injuries attributed to the "older" pesticides—i.e., arsenicals—which recur year after year with surprising constancy.

The control of pesticide poisoning is a complex problem, for which there is no single or pat answer. It is generally agreed that increasing safety awareness of the public, wider use of precautionary labeling, and improving the accuracy of poisoning statistics would go far in controlling unintentional intoxications.

Further comments on toxicty were contained in the report by J. F. Treon, E. E. Larson, and J. Cappel, University of Cincinnati, who advised, the heating of technical aldrin introduces into the surrounding atmosphere a significant amount of toxic material, the composition of which varies with the temperature. Although the degree of toxicity of the atmosphere depends to a large extent upon the specific temperature to which the aldrin is heated, the relationship between temperature and toxicity is not direct over a wide range of tempera-

ture, in part at least because of a decrease in the concentration of aldrin due to thermal decomposition, and in part because of a decrease in the toxicity of the decomposition products formed at or above 1000°F.

An increase in the temperature results in an increase in the quantity of aldrin vaporized in the atmosphere, but as the vapor-laden air is cooled so as to be respirable (from the aspect of temperature) for experimental animals, much of the aldrin separates out in particulate form and the concentration of the vapor remains but little elevated.

Mr. Treon suggested that on the basis of experiments with aldrin at high temperatures, it is unsafe to fight fires in which aldrin is involved without respiratory protection.

About Pesticide Developments

E. Selz and P. Lindner, Emulsol Chemical Corp., Chicago, presented the following discussion:

As a universal emulsifier has so far proved impossible, certain combinations of different emulsifiers have been developed which cover a wide range of formulations. The introduction of calcium salts of alkyl aryl sulfonic acids contributed to the effectiveness of possible emulsifier blends, but calcium has a tendency te form insoluble 2,4-D salts in 2,4-D ester formulations. For this reason the emulsifiers used for herbicide formulations should be free of calcium. Certain amine salts, and outstandingly certain polyamine salts, are of marked utility in herbicidal formulations. Special formulations are required for some of the organic phosphates and carbamates and for PCP (pentachlorophenol).

Combined applications of pesticides with fertilizers raise new and formidable problems. There are many serious disadvantages in the use of dry mixes. The combination of emulsifiable liquid pesticides with liquid fertilizers, particularly when field-mixed, has many obvious advantages. It is now possible, through the development of certain novel emulsifier compositions, to pre-

pare emulsifiable pesticide formulations which are compatible with concentrated liquid fertilizer solutions.

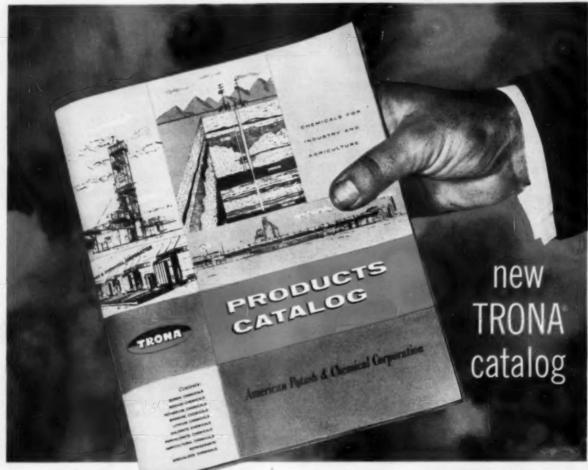
Two new organophosphorus derivatives of p-dioxane with excellent insecticidal and acaricidal activity were reviewed by W. R. Dively, A. H. Haubein, A. D. Lohr, and P. B. Moseley, Hercules Powder Co.

The pesticidal activity and mammalian toxicity of 2,3-P-dioxanedithiol S,S-bis (O,O-diethyl phosphorodithioate) (I) and the corresponding methvl ester (II) were summarized. The technical ethyl ester is also known as Hercules 528. These materials may be synthesized from 2.3-dichloro-Pdioxane and the appropriate O,O- dialkyl hydrogen phosphorodithioates in the presence of equivalent amounts of certain bases such as pyridine or catalytic amounts of certain catalysts such as zinc chloride, or from P-dioxene and bis (dialkoxyphosphinothioyl) disulfide in the presence of catalytic quantities of iodine.

In-Package Fumigation

Ammonia gas is fungicidal to some common mold organisms which may attack citrus fruits after harvest during shipment and storage. F. A. Gunther, R. C. Blinn, J. H. Barkley, and M. J. Kolbezen and E. A. Staggs, University of California Citrus Experiment Station, reported that since bulk fumigation with this gas may not afford the long-term protection sometimes required under commercial conditions, in-package generators of ammonia have been developed to maintain critical concentrations of the gas ambient in the commodity over long periods. These generators are activated by the highly humid-environment within a package of actively respiring plant parts. Two types of practical generators were discussed, with applications to citrus fruit handling. The first type involves the simple hydrolysis of diammonium succinate, whereas the other utilizes the moistureinitiated reaction between dry ammonium sulfate and dry soda ash. Many formulations incorporating these and related reactants have been evaluated in terms of physiocochemical behavior as related to biological performance.

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Soil Conditioners-Requirements Discussed at CFA Meeting

2 50 persons took part in the fifth annual California Fertilizer Conference in Fresno on Monday, April 15. Sponsored by the California Fertilizer Association's Soil Improvement Committee, program interest centered on potash problems and on minor element deficiency symptoms and correction. These were the subjects of the two panel discussions. The program was held on the new campus of Fresno State College, with participants joining in a conducted tour of the facilities, following the program.

Dr. Firman E. Bear of the Soils Department, Rutgers University, New Brunswick, New Jersey, was the featured speaker following the banquet at the Fresno Hacienda Hotel, on the subject "Land For Living." Dr. Bear said that there are currently 170 million people in continental United States, with the population increasing by one person every 12 seconds. A total of 3 million more are expected during 1957.

He reminded that of the 1,904,-000,000 acres of land which we have in our country, more than one-half -over 1 billion acres-has only limited value. About 150 million acres is desert, 600 million acres is semiarid, and 300 million acres in a semihumid state, which is affected by dry desert winds. The desert produces no useful vegetation, the semi-arid yields grazing for one steer on an area of 25 to 75 acres. The semihumid area offers marginal possibilities for grain-growing, with ups and downs from year to year, depending on weather cycles.

One answer to the continuing problem of feeding our growing population, lies in irrigation. Cloud-seeding and sea water reclamation are also possibilities for new water sources which we are now hopefully exploring. These possibilities, he suggested, cannot be lightly dismissed, but neither can they be depended uopn for any great agricultural expansion.

Other suggestions have been offered, including transportation of Great Lakes water to semi-arid farming areas, storage of run-off waters behind dams or underground by infiltration. Unless some such approach proves practical, Dr. Bear believes, we may have to learn to get along with even much less fresh water per person than is our present custom, and settlements along the seashore may have to make use of seawater for purposes other than drinking, wasning and irrigating.

President Jack Baker of the California Pertilizer Association outlined the importance of the program of the Association's Soil Improvement Committee, which sponsors the annual fertilizer conference,

President A. E. Joyal and Dean Lloyd Dowler of the Agricultural Department of Fresno State College welcomed the delegates to the campus, and outlined the history of its recent growth.

Co-chairman J. H. Nelson and Earl R. Mog, both of Stockton, were in charge of the conference program, with Mr. Nelson presiding. Formal papers were presented during the morning by Dr. Albert Ulrich, University of Calif., Berkeley, on "Plant Analysis as a Guide to Fertilization"; "Soil Conditioners - Some of the Things Now Known About Their Effects on Soils and Plants," by Dr. R. E. Warnock, California Spray-Chemical Corporation, Richmond; Robert Z. Rollins, Chief, California Bureau of Chemistry, Sacramento, on topics involving regulation of the sale of fertilizers and agricultural minerals: "l'otash Responses in Deciduous Orchards," presented by Dr. Kiyoto Uriu, University of California, Davis, from a paper prepared by Dr. Omund Lilleland, University of California; and "Potash Sources and Products," by M. E. McCollam, American Potash Institute, Inc., San Jose.

Two panel groups, one on Potash and the other on Micro-nutrients, were presented. Audience participation in the discussions was lively. Those on the Potash Panel were Dr. J. E. Knott, University of California, Davis, moderator; Drs. W. E. Martin, T. W. Embleton, O. A. Lorenz, and Herman Timm, all of the University of California, and

Forrest Fullmer, American Potash Institute, Inc., Newport Beach.

On the Micro-nutrients Panel were Dr. D. G. Aldrich, Jr., University of California, Davis and Berkeley, moderator; and Drs. John Lingle, Kiyoto Uriu, Walter Reuther, and Arthur Wallace, all of the University of California.

On April 14, the members of the University of California Fertilizer Committee were guests of the C.F.A. Soil Improvement Committee at an informal dinner.

Plan Dec. N. C. Weed Conf.

The North Central Weed Control Conference will hold its 14th annual meeting in Des Moines, Iowa, on Dec. 10, 11, and 12.

Conference headquarters will be at the Hotel Savoy. Papers will be presented in the Memorial Auditorium. Persons interested in presenting papers at the conference have been asked to contact Lyle A. Derscheid, Agronomy Department, South Dokota State College, Brookings, S. D., program chairman.

Industrial firms interested in exhibiting their products at the conference are contacting Lloyd Van Patten, Department of Agriculture, Des Moines, who is co-chairman of general arrangements for the conference. Exhibits will be located in Memorial Auditorium.

Seeks Better Crop Reporting

Crop Reporting activities of the United States Department of Agriculture can be vastly improved through closer liaison with the local and national press, in the opinion of Philip I. Ross, chairman of the department's advisory committee.

Speaking before the National Conference of Agricultural Statisticians in Kansas City, Mo., April 17, Mr. Ross emphasized the vital role played by newspapers in stimulating interest among farmers and city dwellers in the crop and livestock reporting program of the Department of Agriculture. The conference was attended by 200 state statisticians of the Agricultural Marketing Service who compile data on farming activities in 42 states.

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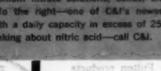








Welcome to our gallery. To the left-trade marks of some famous companies which have nitric acid plants that were designed and constructed by C&I. Many of these firms also operate C&I designed facilities for the production of ammonium nitrate solutions, solids, and complex fertilizer. To the right-one of C&I's newest nitric acid plants with a daily capacity in excess of 250 tons. If you are thinking about nitric acid-call C&I.



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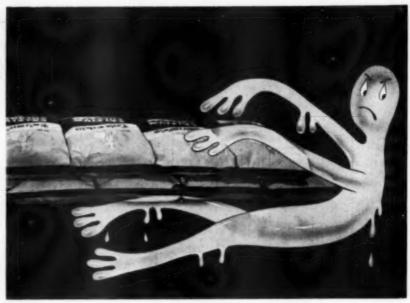


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Costs of basic research, and potential returns . . . theme of address by Roy Hansberry at annual WACA meeting, April 2

IT is not necessary to do research in order to make money in the agricultural chemical business," said Roy Hansberry, Shell Development Company, Modesto, Calif. when he addressed the Western Agricultural Chemical Association April 2, 1957 in Los Angeles, Calif. The statement seemed odd, for a manager of one of the best of the agricultural research laboratories in the country,—and Dr. Hansberry continued this thought in saying "We can make money by selling, we can make money by manufacturing, or we can make a little money in research.

"From news stories and from personal discussion I gather that a number of general firms are considering the initiation of agricultural chemical research programs. Some of these firms are already in the business of manufacturing and marketing agricultural chemicals, but are now embarking on research for the first time. A few of them may be initiating research as a means of entering the agricultural field.

"At the same time, we hear of several firms who are getting out of the agricultural chemical business. During the past two years, we have been offered several package deals to purchase the accumulated research know-how, patents, and records of firms which have conducted agricultural research over the past years but are now discontinuing it. There is apparently some indecision as to whether agricultural research is a good thing for a firm to do or whether it is an unrewarding use of stockholders' money. Perhaps the most important aspect of research in this field is to discuss whether or not one should do it at all."

Dr. Hansberry reminded his audience that research is an extremely expensive operation . . . that good research scientists are hard to find, payroll, apparatus, and building costs are high, and the cost of obtaining the residue and toxicological data required by government regulations are beyond the resources of the small agricultural chemical manufacturer. "It is for these reasons that agricultural chemical research in industry is largely limited to the multi-million dollar firms, and we find relatively few new agricultural chemicals being introduced by the smaller operator."

"After having said that one does not have to do research, that research is very expensive, and that research may not be productive, we should look at the arguments for doing research.

"Three values of a research program are: technical guidance and control, keeping up with competition, and prestige or public relations value. But no one of these, or all three together are sufficient to justify a research program. The real reason for doing research is the intention to invent." Dr. Hansberry emphasized, however, that a research staff must have the utmost flexibility of operation, and they must have the support of management in commercialization of their feasible developments. It is almost impossible to specify exactly what compounds are to be discovered or "invented." "Management must be prepared to adapt their business to the findings of research."

Dr. Hansberry discussed, too, the economic aspects of research, and reminded his audience that "If research had to depend for its support only on that part of the profits for which no other immediate use could be found, it would probably never get done. A research program should be based on what the company expects to be selling 5 years from now, not what it sold last year."

Commenting on fundamental research and its place in the agricultural chemical business, Dr. Hansberry reported that his own employer, Shell's Agricultural Research Division probably spent 15 to 20% of time and money in undirected research which has no commercial end in view. He further developed the need and eventual use of basic research by reminding his audience that DDT and the dinitrocresols came from research in the dye industry; that the phosphate insecticides started out as rubber accelerators, and ingredients of plastics went through the phase of being war gases before they ended up as insecticides.

He reported too that D-D® came from basic research in substitutive chlorination of propylene, and that the recent developments of Nemagon* Soil Fumigant and

Why research?—with costs high, immediate returns uncertain, a top research executive discusses this question for the agricultural field industry

Phosdrin* Insecticide came more or less directly from the combined chemical and agricultural research of the Agricultural Research Division. Shell, he said, didn't discover aldrin, dieldrin, and endrin,—but these were no less a product of research at Julius Hyman and Company. The marketing of these products by Shell and the later purchase of Julius Hyman and Company were again indirectly due to Shell's having an effective research organization.

Money invested by a company in research is like money invested in common stocks. Sound investments in manufacturing, packaging, distribution, or advertising will pay a fairly secure and regular dividend, while dividends from research investments may be slow to appear. But if the investment has been backed by proper economic study, the eventual value of the investment may be very great indeed.

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ACP Elects Williamson



George H. Williamson has been elected vice president in charge of West Coast activities by the American Chemical Paint Co., Ambler. Pa. Mr. Williamson, who has been associated with the company since

the company since 1935, was a pioneer in the use of ACP Thermoil-Granodice as a heavy manganese phosphate wear-resistant coating in the automotive industry.

in the automotive industry.

Mr. Williamson supervises the sales and service of metalworking, agricultural chemicals and processes, and manufacturing at the company's plant in Niles, Calif.

Davison's Liquid Fertilizer Plant

Davison Chemical Company, Division of W. R. Grace & Co., entered the liquid fertilizer field with a plant at Wakarusa, Ind. in the spring of 1956. The plant provides for the production and storage of aqua ammonia and neutral complete liquid fertilizers as well as storage for bagged and bulk dry fertilizers.

Aqua ammonia is prepared by combining anhydrous ammonia and water in a "converter." The aqua ammonia is continuously pumped to outside storage tanks for later sale or mixing, or to applicating and transport tanks for direct application. The converter is designed to mix and water-cool aqua ammonia, and to be used interchangeably for cooling neutral liquid fertilizer.

Neutral complete liquid fertilizers are formulated using aqua ammonia, phosphoric acid, urea, and muriate of potash. Grades such as 5·10·10, 8·8·8, 8·24·0, and 14·7·7 are produced at the rate of 15 tons per hour. The actual mixing of these grades is accomplished by reacting balanced proportion of aqua ammonia and phosphoric acid under non-corrosive conditions controlled by a pH instrument. The liquid fertilizer being formulated is continuously cooled by pumping the liquid through the converter.

Medfly Trappings Down

Only 21 adult Mediterranean fruit flies were found during February in 46,000 survey traps in Florida, the U.S. Department of Agriculture reported. This compares with 82 of the pests found in January and is the lowest monthly total so far in the tenmonth eradication campaign.

The 21 adults, plus 171 immature flies, found represent four recurrences of finds in insecticide-sprayed areas of Dade, Lee, Hillsborough, and Sarasota counties. No new counties were found invaded by the pest.

Allied Branch In Memphis

Nitrogen Division, Allied Chemical & Dye Corp., New York, opened a branch sales office in Memphis, Tenn., in April.

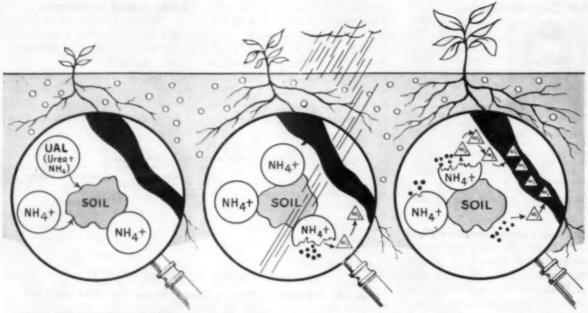
Jack F. Dulaney is in charge of the new office which serves Tennessee, Louisiana, Mississippi, Arkansas, Oklahoma, Texas, and New Mexico.

1954 Census of Manufactures Report

	No. Establishments	Value of Shipments	
Insecticides and Fungicides			
90% specialization	202	105,603,000	
other	81	79,010,000	
Household insecticides, repellants	174	52,436,000	
90% specialization	122	19,568,000	
Weed killers	29	16,714,000	
90% specialization	16	4,901,000	

Quality and Value of Products Shipped In the U. S. 1954 and 1947

	Total s	Total shipments including interplant transfers			
	1	1954 1947		947	
	Value \$1,000	Quantity 1000 lbs.		Value \$1,000	Quantity 1000 lbs.
Insecticides & fungicides	177,956			83,356	
for agricultural use:					
arsenical preparations	** ***				0.148
lead arsenate, acid and basic	\$2,923	13,520		3,527	9,365
calcium arsenate	183	2,413		1,925	11,044
other arsenical insecticides	1,312	13,408		5,319	47,967
and fungicides					
Sulfur containing prep. wettable	80.000	011000		0.000	100 011
sulfur and sulfur dust	\$9,309	311,079		3,256	158,041
Rotenone containing insecticides dusts	2,802	15,881		4,141	19,494
Sprays (excluding fly sprays)	421			450	535
BHC preparations, without DDT but					
including lindane (no fly sprays)	10,482	51,456	:	3,319	13,301
DDT containing preparations exclud- ing aerosol and flysprays					
a) DDT as active ingredient	28,143	178,702		16,141	68,875
b) DDT and other toxicants	15,099	149,517		3,096	18,767
Chlorinated hydrocarbon pesticidal preparations other than those					
containing BHC or DDT	31,309	120,301			
Organic phosphate-containing					
pesticidal preparations	11,881	44,751			
Synthetic organic fungicides and					
seed disinfectants	12,443	24,314			
Petroleum oil sprays (excluding fly sprays and aerosols) 1000 gallons					
oil sprays and emulsions without					
other toxicant	4,386	14,661		5,488	10,849
oil sprays containing other					
toxicant	6,578	4,180		515	1,175
Herbicides					
arsenical preparations	2,050			1,364	
sodium chlorate preparations	4,559	74,599		1,087	
2,4-D and derivatives	16,408	48,092		3,667	
2,4,5-T and derivatives	4,339	8,648			
other weed killers hydrocarbon	7,389				
weed killers not specified by type	1,149			219	



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2. This ammonium nitrogen resists leaching. Nitrogen is made available to the plants when soil bacteria convert the ammonium nitrogen to nitrate nitrogen.

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Four formulations are available, including UAL 37—a special composition that releases nitrogen even more slowly. For technical assistance and information on the solution best suited to your use, write Du Pont.

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Safety Award To Monsanto

The Award of Honor of the National Safety Council has been presented to the Monsanto Chemical Co., St. Louis, Mo., for the outstanding safety record set during 1956.

The company's 1956 accident frequency rate of .95 major injuries per million manhours worked was a 27 per cent improvement over the 1955 rate of 1.31. The award of honor is the highest recognition that the safety council can make.

Malathion For Boll Weevil

The U.S. Department of Agriculture has announced the registration of malathion for use against the boll weevil.

Malathion was recommended by the National Cotton Council following the U.S.D.A.'s Cotton Insect Research and Control Conference last December in Birmingham, Ala. It is included this year in the state cotton insect control recommendations of Texas, Louisiana, Mississippi, Georgia, Arkansas, and Alabama. Malathion is a development of the American Cyanamid Co'., New York.

Need For Research Cited

William D, Hogan, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., told the Soils and Crop Science Society of Florida at Clearwater, Fla., that the chemical industry must take for granted the fact that one of the largest single cost items in the development of biological chemicals is the research necessary to assure that these chemicals can be marketed without introducing a hazard to health.

Fifteen years ago, he said, when most pesticides were based on simple inorganic derivatives of lead, arsenic, sulfur, etc., the problem was more straightforward than today when complex organic compounds are the general rule.

Mr. Hogan cited a few of the new weapons being developed for the battle against nature's constant struggle to fight off wholesale destruction 'of any of her species, "be they hurtful or helpful, weeds or bugs, spores or blights." Among the "newer weapons" mentioned were: antibiotics, systemic insecticides and fungicides, plant growth regulators, and atomic energy.

Field Day For Tree Study

Research on trees is to be the theme of the annual field day of the Connecticut Agricultural Experiment Station at the experiment farm in Mt. Carmel on Aug. 14.

Guests of the station will be shown how research is carried on to discover and understand the processes that go on in trees and wood. J. Peter Johnson of West Haven is general chairman of the field day committee.

New Du Pont Herbicide Unit

A new production unit to manufacture sulfamic acid and "Ammate" weed and brush killers will be built by the Du Pont Co., Wilmington, Del., on the site of its present plant at East Chicago, Ind.

Five SAACI Golf Outings

Five golf outings have been scheduled for 1957 by the Salesmen's Association of the American Chemical Industry, New York. The outings will be held on May 14, June 6, July 9, Aug. 5, and Sept. 10. Arthur C. Curran, Meer Corp., New York, is chairman of the golfing committee.

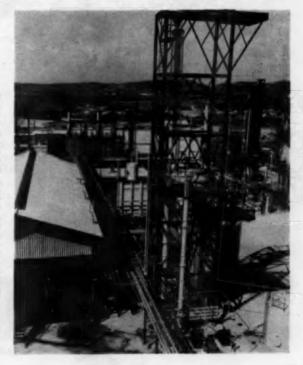
Puerto Rican Ammonia Plant Built By Lummus Co.

Puerto Rico's first big basic fertilizer plant has been completed at Guanica, on the Commonwealth's south coast. The \$12,250,000 facility was built by the Lummus Co., New York, for Gonzalez Chemical Industries, a new Puerto Rican firm with heavy U. S. private financing.

The plant is geared to produce 40,000 tons of anhydrous ammonia a year using the Texaco synthesis gas process. Crude oil from Venezuela will form the hydrocarbon raw material A separate unit at the Guanica site will turn out 15,000 tons of sulfuric acid. The major end product will be 130,000 tons of ammonia sulfate, which, along with smaller quantities of aqua and anhydrous ammonia, will supply Puerto Rico's growing fertilizer market.

Gonzalez Chemical received ten years full tax exemption under the "Operation Bootstrap" industrialization program implemented by the Economic Development Administration.

Puerto Rico's first ammonia plant, built by the Lum-mus Co., New York, for Gonzalez Chemical Industries, is geared to produce 40,000 tons of anhydrous ammonia per year. In the left fore-ground is the combuilding pressor and, on the right, the ammonia synthesis converter. The hydrogen box and pipeway are shown in the center and the Texaco generators are in the background.





A pesticide formulation built on Diluex or Diluex A will give the best assurance of adequate field performance. Foilage penetration, uniform coverage, improved adhesion, and minimum toxicant fractionation can be obtained in dusts properly conditioned with these quality products.

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Ammonia From Coke Oven Gas

The first plant in America to produce anhydrous ammonia exclusively from coke oven gas is operating smoothly at Birmingham, Ala. This Ketona Chemical Corp. plant is owned jointly by Hercules Powder Co., Wilmington, Del., and Alabama By-Products Corp., Birmingham. The latter supplies the coke oven gas from its Tarrant plant, two miles away.

Based on processes successfully used in Europe, the plant is not only the first on this continent to derive its hydrogen wholly from coke oven gas but it pioneers low-temperature technology in chemical processing.

Aerial Span To Guano Cave

A helicopter crew has strung an 11.500-foot strand of wire across the Grand Canvon from its north bank to a labyrinth of limestone caves high in the canyon wall above the Colorado River.

That wire was used to haul heavier wires in turn until now a one-and-a-half-inch track cable for the world's longest single-span, materialhandling tramway is in place.

The United States Guano Corp. has started hauling fertilizer from Bat Cave. Present plans are to take out 10,000 tons a year. Bat Cave guano ranges in grade from 10-2-2 to 14-2-4.

In full operation, the deposits are sucked from the floors of the chambers of Bat Cave by a vacuum gatherer. This draws the powdery material through a ten-inch pipe to a bag house. From the bag house the guano is dropped to loading bins which discharge their contents into the tramway bucket. In addition to the lateral mile-and-a-half run of the tramway, there is a lift of 2,900 feet involved, from the canyon floor to its rim on the opposite side.



The guano is sacked at the rim, since it comes from the cave in condition to be used. In five, ten, and twenty-five pound sacks, it is hauled in twenty-ton trailers to a warehouse at Kingman, Ariz., where there is a rail connection to Los Angeles.

Horton, Floridin Research Mgr.

The Floridin Company has announced the appointment of Norman H. Horton as manager of research laboratories with headquarters at Tallahassee, Florida,

Mr. Horton's addition to the Floridin staff will permit Jack W. Moore, vice president and formerly acting director of research, to devote increased time to the company's rapidly-expanding sales and distribution activities.

D-O Office In Pittsburgh

Dorr · Oliver Inc., Stamford, Conn., has opened a new office in Pittsburgh, Pa., to serve the process industries in Western Pennsylvania and the Ohio River Valley of West Virginia, areas previously served from Stamford.

Richard M. Sibley of the Eastern Industrial division has been transferred from Stamford to the new office.

Witco Gets Larger Quarters

Mid-Western regional sales headquarters of the Witco Chemical Co., New York, have moved into new. larger offices at the same Chicago location. The sales department of the Emulsol Chemical division has also moved into the new quarters.

Occupying 4500 square feet, the newly-decorated area covers a full floor in the Lincoln Tower Build-

New D-O World Headquarters

The architects rendering of the headquarters building to be constructed by Dorr-Oliver, Inc. in Stamford, Conn. Target date for occupancy is May 1.

Kennedy Named By P.C.A.



F. H. Kennedy has een named sales manager for the midwestern office pany of America, Carlsbad, N. Mex. Mr. Kennedy succeeds T. E. Bradley, who recently retired from active duty with the firm.

The midwestern office is located in Peoria, Ill.

Comm. Solvents Names Two

Commercial Solvents Corp., New York, has named V. Keith Fuller and Denzil M. Waller to its agricultural chemicals sales staff. Mr. Fuller's sales responsibilities are in the states of Illinois and Indiana and his headquarters are at the St. Louis office.

Mr. Waller is assigned to the Southern sales district with headquarters at the company's Sterlington. La., office.

War On Pests Pressed

A House Agricultural subcommittee has approved legislation authorizing the Agriculture Department to eradicate fire ants, the soybean cyst nematode, and witchweed. The legislation would authorize the department to cooperate with states.

Fire ants, which entered this nation through the port of Mobile from Argentina about thirty years ago, have spread through seventeen Southern states.

Chemco Plant in Japan

Chemical Construction Corporation (Chemico), engineering and construction firm, will design a new ammonia plant for Befu Chemical Co., Ltd., in Japan. Befu Chemical Co., Ltd., known as the Sumitomo-Taki Chemical Co., Ltd., is the biggest producer of ammonium sulfate in the Kinki District of Japan.

C. Guterman Dies

Carl Guterman, director of research at the State College of Agriculture and Home Economics at Cornell University, died March 27 in Ithaca, N.Y. He was 53 years old. Prof. Guterman' was director of the Cornell agricultural experiment station from 1942 until his death.



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DES MOINES, IOWA—6th Floor, Hubbell Bldg.

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INDIANAPOUS, IND.—1112 N. Pennsylvania St.
KANSAS CITY, MO.—500 West 39th St.
MINNEAPOUS, MINN.—212 Sixth St. South
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PASADENA, CALIF.—330 Security Bldg.

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N.S.C. Cites Ag. Chemicals

Agricultural Chemicals magazine has been voted the National Safety Council's Public Interest Award for 1956. The noncompetitive award is made annually to public information media for service to safety.

Agricultural Chemicals was among 33 publications in the specialized magazine category to be so cited.

"A review of the 1956 entries shows beyond question the tremendous contribution of mass communication media to the safety movement," said Ned H. Dearborn, council president in announcing the awards. "We are proud to honor the outstanding leadership represented by these awards."

New Mexico Fertilizer Firm

Desert Green Corp., Belen, N. M., is specializing in lawn and garden fertilizers. Potash, superphosphate, a nitrogen compound and an iron and sulphur mineral mixture are being mixed with a base of aged heat-treated steer manure. The new plant has a capacity of 60 tons per day. J. S. Sanches is plant manager.

Spencer Names Kern

Spencer Chemical Co., Kansas City, Mo., has announced the promotion of Byron M. Kern to the position of general manager of production, agricultural chemicals division. Mr. Kern had been general manager of engineering and construction.

Pennsalt Name Change Vote

Shareholders of the Pennsylvania Salt Manufacturing Co., Philadelphia, acted on a proposed change of the corporation's name to Pennsalt Chemicals Corp. at the company's annual meeting on April 24.

Although salt continues to be one of the 106-year-old firm's important raw materials, many present products have no connection with salt.

William P. Drake, president of Pennsalt, said, in his annual report, that continuance of the company's expansion will involve "inevitable non-recurring costs" in putting new plants into operation. "Therefore, in 1957 as in 1956," he said, "we do not anticipate any marked increase in reported earnings." Net profit last year rose to \$2.92 a share from \$2.80 a share in 1955.

Grant Korea Chemical Funds

The International Cooperation Administration has announced that an allotment of \$1 million has been granted to Korea for the purchase of various chemicals from world-wide sources. Agricultural pesticides will account for \$20,000 of the allotment.

Lilly Forms Ag. Division

Eli Lilly & Co., Indianapolis, Ind., has expanded its agricultural research program with the creation of an agricultural research division. Previously, agricultural research had been part of the biochemical research division.

Dr. J. F. Downing has been named director of the division. Dr. C. C. Leben is head of the agricultural research department and O. K. Behrens is serving as consultant to the new division.

Four facts for users of absorbent clay

Absorption qualities of clay can be the cause of production problems and inferior product performance. High absorption qualities automatically assure smoother, more even results in grinding and impregnating all toxicants such as DDT, BHC, Malathion, Toxaphene and many others. Pikes Peak Absorbent Clays are selectively mined and carefully processed to guarantee the superior absorption necessary to maintain your quality production standards.

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Service is the vital factor in many clay purchases. You must have it when you need it. And you must have a source you can depend on to come through on tight schedules as well as during the lull seasons. Write us soon. Put us on the spot. Make us prove clay quality. Demand that we demonstrate what we mean when we say "with Pikes Peak Clay, you get service and quality you can depend on."



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350 At North Central ESA Meeting Hear Insecticide Residue Discussion

A DISCUSSION of the insecticide residue problem highlighted the 12th annual conference of the North Central Branch of the Entomological Society of America at the Savery Hotel in Des Moines, Iowa, on March 27-29.

More than 350 entomologists and pesticide industry representatives registered for the meeting.

Dr. George C. Decker, Illinois Natural History Survey, Urbana, Ill., was chairman of the residue discussion. Speakers included Justus C. Ward, assistant head, Pesticide Regulation Section, Plant Pest Control Division. Agricultural Research Service, USDA, Washington, D. C.; Clifford C. Roan, Kansas State toxicologist; Arthur W. Lindquist, USDA, Washington; Dr. E. F. Knipling, Entomology Research Division ARS, USDA, Washington; and a two-man panel comprised of Dr. Decker and Stirling Kyd, extension entomologist, University of Missouri. Dr. Ray Hutson, Michigan State College, moderated.

Dr. Ward reviewed the events leading up to the adoption of the Miller Amendment to the Food and Drug Act. These milestones included "scare" type articles in newspapers and magazines, the discovery that small residues of DDT may be present in milk under some circumstances, and the various investigations of 1950 and 1951.

During the summer of 1956, two years after the adoption of the Miller amendment, a review of the uses of pesticides on raw agricultural commodities registered under the Federal insecticide, fungicide, and rodenticide act revealed that:

Tolerances are lacking for many chemicals in common use on forage crops and on meat or dairy animals. Many chemicals have tolerances on only a small percentage of the uses which have been registered. And, adequate proof that there are no residues from uses of chemicals in

accordance with registered directions is not available for a large number of products not covered by tolerances.

Under the law, Dr. Ward said, any residue of a chemical on a crop for which no tolerance has been established, is an illegal residue, unless the chemical has been declared safe or has been exempted from the need for a tolerance.

Recommending agencies must watch carefully, Dr. Ward warned, to avoid setting spray schedules or specifying other uses of chemicals which would risk the contamination of raw agricultural commodities so that they could be subject to seizure. This, he said, emphasizes the importance of compliance with the new law as completely and promptly as possible.

Aggressive programs of toxicology are being set up in recognition of the need for broader knowledge about the hazards of life in a chemical age.

"It is inevitable that more studies on pesticides will be included in that program as it formally gets underway," he said. "Until more facts are available for many pesticides, recommendations may have to be withheld and certain registrations corrected to be sure we stay within the new law. It is certain that many labels must be changed."

Dr. Knipling discussed the use of insecticides as of "Today, Tomorrow, and Ten Years Hence."

The foremost problems of the present time, he said, lie in the field of toxic residues and in making recommendations that will control insects without danger of illegal residues. "The Agricultural Research Service has given careful consideration to the matter in attempting to determine what uses should be continued for the 1957 season," Dr. Knipling explained. "It has been decided to continue to recommend all uses except those that are known to produce residues in milk and other commodities for which

tolerances have not been established. Recommended uses that cause residues in excess of established tolerances will be withdrawn or suitably modified," the USDA entomologist said.

As to where the industry will be ten years from now, Dr. Knipling listed a number of things that must be done to overcome obstacles that lie in the way of progress. Among these, he said, is the necessity to provide a balanced program on biological evaluation of insect control chemicals and on residue studies.

Another matter is to conduct adequate studies on the pharmacology of insecticides and early translation of findings into practical application.

Dr. Knipling concluded by calling for the establishment of tolerance levels that apply to a wider range of insect control recommendations and commodities, a safe but practical tolerance in special foods, and for educational programs to assure greater compliance with recommended insecticide usage.

As part of a section on cereal crop insects, Dr. J. H. Lilly, Iowa State College entomologist, described the progress of insecticide-fertilizer mixtures in that state, showing tremendous increases in usage since 1951 when only 10 acres were treated with such a mixture. In 1955, by contrast, some 668,250 acres were treated, and 661,270 acres in 1956.

Dr. Lilly pointed out that the strongest argument for the use of pesticides with fertilizers is their convenience. Cost of application remains high regardless of how little insecticide may be used per acre, a fact that lends itself to accomplishing two objectives in a single application.

"Both real and imaginary problems arose when insecticide-fertilizer mixtures came into common use," he said. "The problem of having the right insecticide and dosage in enough fertilizer grades to meet the needs of all farmers seemed insurmountable to some. Actually, experience in the Corn Belt has not confirmed this belief. The 10-pounds-per-ton level of insecticide, designed to give an insecticide dosage of ½ pound per acre with 100 pounds per acre of starter fertilizer, has worked surprisingly well. Many fertilizer manufacturers and some dealers are set up to do custom mixing."

Dr. Lilly reported that a "surprisingly consistent preference for the starter fertilizer mixtures has been evident in Iowa since 1952. Undoubtedly the availability of the mixtures and the commercial promotion of them have speeded the adoption of soil insecticides. Apparently the trend in favor of the mixtures has not been evident in most other Corn Belt states, although it has long been popular in the Southeast."

"Custom mixing of insecticides and fertilizers may increase their use and versatility," Dr. Lilly concluded, "There is good evidence that corn rootworms can be controlled under some conditions with less than ½ pound of insecticide per acre by this method. There is a need for more than a single dosage level for use on corn in the North Central States," he said.

The present status, value, accomplishments and future plans for economic insect surveys were discussed in a paper by L. G. Davis, assistant head of the insect survey section of USDA, Washington. He reviewed the tremendously stepped-up program of intercepting economic insects and plants at various points of entry into

the U. S., and observed that the vigilance on the part of government must not be reduced in any way.

In support of this statement, Dr. Davis presented statistics to show how greatly the activity along this line has increased during the past ten years. The number of aircraft inspected in 1947, he said, was 60,113. In 1956, it was 97,351 — an increase of 62 per cent.

Dr. Davis reported that of the nearly quarter-million interceptions of unauthorized plant material, some 17, 500 lots had plant insects. These included some pests considered particularly dangerous to agriculture, he said. Among them were 162 Mediterranean fruit flies, 139 citrus canker, 128 black spot of citrus, 16 mellon flies, 29 Oriental fruit flies, 26 golden nematodes, 110 West Indion fruit flies, 17 olive fruit flies, 164 pink bollworms, and six durra stem borers.

Dr. Don Wilbur, Kansas State College, Manhattan, Kans., was elected chairman of the North Central Branch at the meeting. Roscoe Hill, University of Nebraska, Lincoln, was named chairman elect. Everett Bussart, Velsicol Chemical Corp., Chicago, was made a member of the national governing board, and Al Buzicky, University of Minnesota, St. Paul, was named member-at-large of the executive board.

Glenn Insect Repellent

Tabutrex, a new insect repellent manufactured and distributed by the Glenn Chemical Co., Chicago, is a colorless, odorless liquid which can be used safely in water, oil, or wax.

The repellent has been used successfully around loading docks and other openings where houseflies and blow flies are attracted. Riding horses sprayed with Tabutrex have been protected effectively against stable flies. Tabutrex has been approved by Federal regulatory agencies for repelling flies, roaches, and household ants.

Award Gypsy Moth Contracts

Contracts have been awarded to three aerial spraying firms to apply 2,400,000 gallons of DDT—oil mixture in three northeastern states in the cooperative Federal-State gypsy moth eradication program.

The contracts, totaling approximately \$1,750,000 were awarded to Lebonair Inc., Lebanon, Pa.; Chris D. Stolzfus, Coatesville, Pa.; and Roberts Aircraft, Boise, Idaho. Areas to be treated include land in New York, New Jersey, and Pennsylvania.

New Portable Ribbon Mixers

The Young Machinery Co., Muncy, Pa., is producing a new line of portable, heavy duty horizontal ribbon mixers which range up to a 20 cu. ft. working capacity.

The mixers are available in carbon steel, stainless steel, and monel metal, with or without heating or cooling jackets. Discharge from the mixers is made either from the center or the end by a slide gate or a worm gear operated plug gate.

Furnished complete with motors and drives, the mixers are recommended for mixing dry, free flowing powders or granular materials.

Diamond Appoints Osborne

Elmer G. Osborne has been appointed sales supervisor and acting manager of the Montgomery, Ala., office of Diamond Black Leaf Co., Cleveland, Ohio. Mr. Osborne is responsible for the administration of sales in the Southern district.

Mr. Osborne joined Diamond Black Leaf in 1955.





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Igepon and Nekal products manufactured by General Aniline & Film Corp. are sold outside the United States under the trademarks "Fenopon" and "Antara-Humifen," respectively

NPFI Plans National Survey

A national survey "to determine the factors which influence the farmer to buy fertilizers" soon will be undertaken by the National Plant Food Institute, Washington, D. C., as a preliminary step in expanding the fertilizer market.

The survey was authorized by the Institute's Board of Directors.

"Information obtained in the survey more clearly will point the direction that should be followed to achieve an expansion of the fertilizer market," Dr. Russell Coleman, executive vice president of the institute, said.

"The fertilizer industry has a productive capacity of 25 to 50 per cent more plant food than it is now selling. Yet agricultural leaders say that fertilizer usage should be at least twice the present consumption. The need for an accelerated promotional program, conducted in harmony with the recommendations of the land-grant colleges and other recognized agricultural agencies, is apparent."

Dr. Coleman said that "plans for a forward looking program to achieve greater fertilizer acceptance and usage now are in the preliminary stages," and added that "shortly, a detailed promotional program will be presented to Institute members for their consideration."

WARF Story In Geographic

The February issue of the National Geographic magazine carried an article about the state of Wisconsin which mentions the work being done by the Wisconsin Alumni Research Foundation, Madison.

A few of the foundation's achievements which were listed include: dicumarol, an anticoagulant; warfarin, a fantastic rat poison; Q-176, a new strain of penicillin; and nicotinic acid, a cure for pellagra.

Forecast Farm Acreage Cut

The U.S. Department of Agriculture has reported that farmers's planting intentions for 1957 indicated the smallest crop acreage under cultivation in forty years.

Especially heartening to Federal farm officials were expected re-

ductions in such surplus headaches as wheat, corn, some small feed grains, rice, and tobacco. Part of the decrease will be accomplished by Federal acreage controls and by the soil bank. Drought has also accounted for a part of the reduction.

McDonnell Joins MCC

William P. McDonnell has joined the sales staff of Michigan Chemical Corp., St. Louis, Mich. His headquarters are at the company's eastern sales office in New York.

Gibberellic For Formulators

Commercial quantities of gibberellic acid have been made available from Abbott Laboratories, North Chicago, Ill., in crystalline form ready for commercial formulation.

Abbott's chemical sales division has announced that special technical service representatives will provide assistance in formulation or other problems to commercial formulators so that products incorporating the gibberellic acids can be marketed with minimum delay.

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Israel Chemicals Progress

Israel's chemical industry is progressing to the point where the country is already self-sufficient in fertilizers and small quantities are available for export. In addition, the country is expected to discard dependency on calcium carbide imports when a new plant, under construction at Petan Tiqva (near Tel Aviv), starts production late this year.

Indicative of Israel's expanding fertilizer industry is the fact that ammonium sulfate, potassium sulfate, and ammonia were produced in large quantities for the first time during the past year.

Mathieson Plant Operating

A new sodium silicoflouride plant, built by Olin Mathieson Chemical Corp., at Pasadena, Texas, is now in full production. Adjoining the high analysis Ammo-Phos fertilizer plant of the company's Plant Food division, the new unit recovers flourides from phosphoric acid manufactured at this location.

Urge Land Lease Increase

Several chemical companies are reported to be urging Congress to double the area of phosphate lands in a single state which may be held under lease from the federal government by a single operator. The companies say that such legislation would encourage development of western supplies of the mineral and provide industry with a cushion for expanding operations.

The San Francisco Chemical Co. has opposed the change, however, stating that the removal of the state limitation would induce wasteful practices in the industry in the mining of the rock.

Shell Adds To Denver Plant

Shell Chemical Corp., New York, is building a new plant unit at its Denver plant to produce methyl parathion. The plant is expected to be completed early this month.

The company is adding methyl parathion to its line of insecticides primarily to help fight boll weevil infestations in southern cotton crops.



MALATHION stops hard-to-kill boll weevils fast

...and offers safety in use!

"Hard-to-kill" or "resistant" boll weevils are becoming a real problem all through the cotton belt. Standard, chlorinated insecticides just aren't killing these strains. But, malathion a phosphate insecticide - kills 'em fast!

"One of the safest insecticides to hundle" says the U.S.D.A. about malathion. It has the lowest toxicity for man and animals of any insecticide that will be recommended for boll weevil this year. And malathion is compatible with most other insecticides recommended by local agricultural authorities.

Kills all these cotton insects: Malathion stops aphids, mites, leaf hoppers, white flies, leaf worms and leaf perforators when present.

Does the job in 48 hours ... really cleans up weevils. You get protection quickly ... and this maximum kill guards against rapid build-up between sprayings and dustings.

Free literature. Write American Cyanamid Company, Phosphates and Nitrogen Division, 30 Rockefeller Plaza, New York 20, New York.

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Maiathion liquids and dusts are available under the brand names of many wall-known manufacturers.

This ad will reach cotton growers all through the South in "Progressive Farmer", "Farm Journal" and "Farm and Ranch"

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Seek Approved Cost Basis

The Inland Fertilizer Council, Winter Garden, Fla., is seeking to have the term "ammonia" discarded as a basis for use in the sale of fertilizer or materials. The council, a group of more than twenty fertilizer manufacturers, has requested other fertilizer producers, brokers, and importers throughout the country to cooperate in the project.

The council explains that, although formulae are figured on the basis of nitrogen, and retail sales are made on the basis of nitrogen, producers continue to base the price of fertilizer on the per unit of ammonia. The council has requested that fertilizer materials, when not sold on a per ton basis, be offered or sold on a per unit of nitrogen basis.

CCAF Meeting At Fresno

The Central California Agricultural Forum will meet at Fresno on May 23. Discussions will cover irrigation and the use of soil conditioners and soil amendments. Award Nominations Open Nominations have been request-

Nominations have been requested for the third annual Charles F.
Spencer Award, an American Chemical Society award administered by
the Kansas City section, recognizing
achievement in the field of agricultural chemistry. The citation was
founded in 1955 by Kenneth A.
Spencer, president of Spencer Chemical Co., Kansas City, Mo., in memory of his father.

Work to be eligible for recognition must be in the general field of agricultural or food chemistry. The selection of the 1957 winner will be made by a jury of twelve persons appointed by the Kansas City section from ACS membership at large. The 1956 winner was Dr. C. A. Elvehjem, biochemist and Dean of the Graduate School, University of Wisconsin. Dr. Ralph M. Hixon of Iowa State college was the 1955 winner.

Dow Ups Mexican Activities

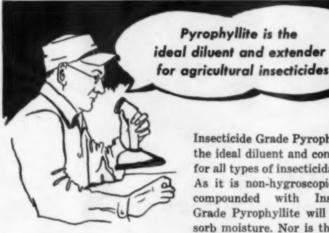
The Dow Chemical Co., Midland, Mich., has purchased a fifty per cent interest in Sales y Alcalis, S.A., a Mexican concern situated near Coatzacoalcos.

Sales y Alcalis, S.A., owns extensive salt mining rights in the State of Vera Cruz on the Tehauntepec Isthmus. The mining site, comprising several hundred acres, was purchased as a location for future manufacturing operations involving caustic soda and other alkali derivatives, chlorine and related products.

Crag Mylone Gets Label

Crag Mylone, a new soil fumigant, has been granted label acceptance by the U.S. Department of Agriculture for use as a pre-planting control of weeds, nematodes, and soil fungi in ornamental propagating beds.

The chemical is manufactured by Carbide and Carbon Chemicals Co., a division of Union Carbide and Carbon Corp., New York. Crag Mylone can be applied as a dry powder with a fertilizer spreader, or as a water suspension with a sprayer or watering can. After application it should be mixed into the soil to a depth of five to six inches.



Glendon's Insecticide Grade Pyrophyllite

Wt per cubic foot-30 lbs

92 to 95% will pass a 325 mesh screen

pH range of 6 to 7

Non-alkaline and chemically inert

Average particle size below 5 microns Insecticide Grade Pyrophyllite is the ideal diluent and conditioner for all types of insecticidal dusts. As it is non-hygroscopic, dusts compounded with Insecticide Grade Pyrophyllite will not absorb moisture. Nor is there any tendency even during extended storage, for the carrier to separate from the active ingredients.

Insecticide Grade Pyrophyllite has superior adhering properties, and because it is difficult to wet, it holds well on the plant leaves even during rain. When used as a carrier for products to be dusted by airplane, it settles rapidly, minimizing drift, waste of materials, etc.



Send for Testing Samples

GLENDON

Pyrophyllite Company

P. O. Box 2414

Greensboro, N. C.

Plant & Mines, Glendon, N. C.



IT COSTS LESS TO GRIND POWDERED PESTMASTER* DDT than any DDT in flake form. Formulators know it is a hard, clean, stable technical grade. The difference in processing cost means more profit for you. The high quality of PESTMASTER* DDT means a better product for your customers. And PESTMASTER* will add uniformity and stability to your product.

If you export or use 75% DDT Wettable Powder you'll like PESTMAS-TER*. You'll like its resistance to tropical conditions, the careful packaging to preserve its qualities, and most of all its uniform wettable and suspension properties. Use the coupon below for samples, prices and conditions.



*Reg. U.S. Pet. Off.

Send a sample of PESTMASTER* DDT Technical Grade (100%)	Prices	
Send a sample of PESTMASTER* 75% Wettable	Prices	
Name		
Street Address		
Company or Government Agency	********	
City State Country		

MICHIGAN CHEMICAL CORPORATION

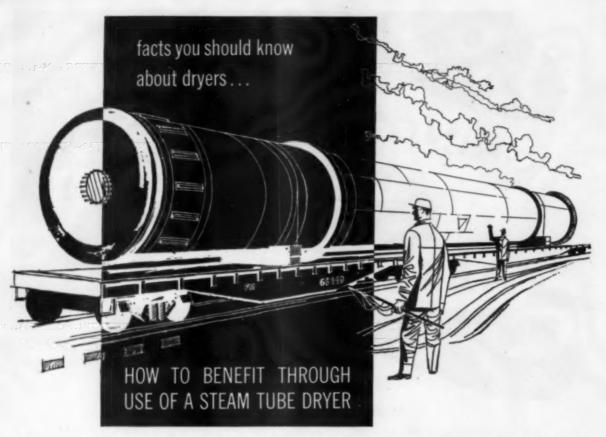
541 Bankson Street

Saint Louis, Michigan

EASTERN SALES OFFICE: 230 Park Avenue, New York 17, New York

QUALITY PRODUCER OF PESTMASTER* DDT AND METHYL BROMIDE AND OTHER AGRICULTURAL CHEMICALS

MAY, 1957



For over 55 years, Louisville Dryers have been solving industry's drying problems and effecting marked economies. This experience can often be applied to provide unusual benefits in specific cases, possibly yours, for example . . .

Q. Since avoiding dust loss and contamination by furnace gases indicates the choice of an indirect heat rotary dryer for my material, what type of indirect dryer would you recommend?

A. Unless there are abnormal conditions, we would recommend a steam tube dryer, especially if the material is heat sensitive.

Q. What advantages does the steam tube dryer offer in comparison with indirect fire types?

A. There are many advantages. One is ease of operation and low maintenance costs due to the definite moderate temperature (established by steam pressure) imposed on both

the material being dried and on the dryer itself. Another advantage is that there is no furnace refractory maintenance. Still another advantage is quick "warm up" and "cool off". In many cases where the drying operation is intermittent, there is no need to shut off the steam supply or stop rotation when the wet material feed is interrupted since steam is condensed in quantity only when wet material is fed.

Q. Isn't steam supposed to be an expensive drying medium?

A. That depends on how the steam is used. It is true that a low overall efficiency results (often as low as 25%) when steam is used to heat air for low temperature drying. However, the Louisville Steam Tube Dryer normally utilizes 85% or more of the available heat in the steam. By combining this with a reasonable minimum efficiency of 80% in modern

small steam generators (and higher in large boiler plants), you get an overall efficiency close to 70%. This compares with indirect fire dryers which develop an efficiency seldom higher than 50% and generally less.

Q. Does material insulate the tubes by sticking to them or by clogging the spaces between tubes?

A. Very few materials have this tendency to any serious extent and most of these, when properly conditioned before feeding, handle without difficulty. For the balance, no dryer using heated surfaces for heating the material is a proper application.

Q. How can I be sure a Steam Tube Dryer will handle and dry my material satisfactorily?

A. The General American dryer pilot plant is at your service. No charge for routine tests and demonstrations. No obligation, either. Write for test date.



LOUISVILLE DRYING MACHINERY UNIT

GENERAL AMERICAN TRANSPORTATION CORPORATION

Dryer General Sales Office: 139 So. Fourth Street, Louisville 2, Kentucky Eastern Sales Office: 380 Madison Avenue, New York 17, New York In Canada: Canadian Locomotive Company, Ltd., Kingston, Ontario, Canada General Offices: 135 S. La Salle Street, Chicago 90, Illinois

World Fertilizer Congress

The third World Fertilizer Congress is being held this year, on September 9 to 12 at Heidelberg, Germany. Organized every fifth year by the International Confederation of Agricultural Engineers and Technicians and the International Center of Chemical Fertilizers, the congress was last held in Rome.

The 1957 congress will take place under the patronage of Dr. H. Lubke, federal minister of agriculture, Germany, and will be presided over by Dr. L. Schmitt of Darmstadt, Germany. The German Organizing Committee has worked out a detailed program for the congress which will be sent to all interested organizations shortly.

Ammonia Use Boosts Profits

Perrin H. Grissom, agronomist at the Mississippi Delta branch Agricultural Experiment Station, Stoneville, Miss., said that a net profit of \$252,000,000 to farmers in the Mississippi Delta area alone has been attributed to anhydrous ammonia's role as a nitrogen fertilizer during the last ten years.

Writing in the March-April issue of the Agricultural Ammonia News, a publication of the Agricultural Ammonia Institute, Memphis, Tenn., Mr. Grissom said he had arrived at the total by considering "conservative estimates of three pounds of lint cotton per pound of nitrogen applied" directly to the soil as anhydrous ammonia and the costs of applying nitrogen, and additional harvesting and handling practices.

Velsicol Display Contest

The "Show and Sell" contest sponsored by the Velsicol Chemical Corp., Chicago, gets underway on May 1 and will continue for two months, closing June 30. Coordinated with a concentrated advertising program for Velsicol's Chlordane insecticide, the contest is offering \$10,000 in prizes to dealers with outstanding store or window displays that show and sell chlordane.

First prize is a one week trip to Paris for two with additional regional and national prizes being

offered. Velsicol also is offering special cash bonuses to salesmen who assist in setting up Chlordane displays, whether or not the display is judged a winner in the contest. The salesmen will get \$2 for each display they help

The contest ties in with a Chlordane regional promotion campaign in California, Florida, Connecticut, New Jersey, the New York metropolitan area, the Midwest, and other key localities throughout the country.

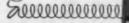
Olin Mathieson Names Smith

Dr. Arthur M. Smith, assistant to the vice president of Olin Mathieson Chemical Corp., New York, has been named to direct the anhydrous ammonia program of the company's Plant Food division. He will maintain headquarters at Little Rock, Ark,

The division sells anhydrous ammonia as a direct application nitrogen fertilizer through dealers operating bulk stations, and also in wholesale quantities to fertilizer companies.

Efficiency of Renneburg Equipment
Helps to Insure Success of
Another Granular Fertilizer Plant

Shown at right is the new 20-ton-per-hour Granular Fertilizer Plant of Charles W. Priddy & Co., Inc. in Norfolk, Virginia, during construction. Visible in the photo are a Renneburg Dryr, Renneburg Cooler, and Renneburg Air Handling Systems. Also included in the plant is a Renneburg Continuous Combination Ammoniator-Granulator.





For the conversion of your present mixed goods plant to the production of the latest types of chemical fertilizers . . . for modernization programs...for complete new plants...or for individual units . . . contact:

Write for Free informative bulletin: "Renneburg Continuous Granular Fertilizer Equipment"

Sons

the Manufacture and Development of Processing Equipment for over 80 years.



space — stacks to any height without

THE BURLAP COUNCIL

of the Indian Jute Mills Association 155 East 44th Street, New York 17, N. Y.

tion. Our customers ask ws to ship

On your side of the fence isn't burlap easier to handle? Doesn't your fertilizer packed in burlap have more

in burlap."

sales appeal?

(popular with farm

wives, too!)

Equipment, Supplies, Bulletins

Small Plot Power Sprayer

A power sprayer which simulates commercial spraying in small experimental plots is described in U.S.D.A. Agricultural Research Service Bulletin 33-36, March 1957. The sprayer has been used for several years at the Twin Falls, Idaho, field station.

It is a portable outfit, with a two-cylinder pump that delivers four gallons per minute at 300 pounds of pressure, a 50-gallon tank, and a one-horsepower gasoline engine. The pump and engine are mounted on top of the tank and placed on a pickup truck. A light-weight iron frame, which supports the 16-nozzle spray boom, is mounted on bicycle wheels. The frame is adjustable so that the wheels can be set to fit rows of any width.

At the Twin Falls station, driveways have been provided in the field so that the truck can be driven through it and the plots sprayed without using more than 75 feet of hose.

Aeration In Bulk Grains

The U. S. Department of Agriculture has issued a report dealing with their experiments on distributing methyl bromide in bulk grains with aeration systems. The tests were conducted by G. L. Phillips of the Stored-Grain Insects Laboratory, Manhattan, Kans.

The experiments took place in upright storages such as concrete elevator tanks, large and small steel tanks, and in flat storages, in the second of a series of studies to adapt grain aeration systems to the distribution of fumigants in bulk-stored grain.

The distribution of methyl bromide in stored wheat, shelled corn, and sorghum grain was observed and, with airflows ranging from 0.01 to 0.25 c.f.m./bu., satisfactory distribution of the methyl bromide was ob-

The tests are described in Agricultural Marketing Service booklet 150

Third Chemical Facts Book

The Manufacturing Chemists' Association, Inc., Washington, D.C., has published the third edition of their Chemical Industry Facts Book which includes sections on the growth and history of the chemical industry, operations of the industry, and everyday use of chemicals.

The illustrated book is 150 pages long and has been brought up to date to cover new developments and uses of chemistry.

New Kraftpacker Brochure

Kraft Bag Corp., New York, manufacturer of multiwal! bags, and sales agents for Kraftpacker Automatic Open Mouth Bag Filling machine for free-flowing material, has issued a new brochure on the newest Kraftpacker model that accommodates weights from 25 to 200 pounds.

Among the refinements in the new model are: heavier gauge steel construction, individually adjustable tubular legs, reinforced contact points, enclosed solenoids, removable and adjustable filling spout, and hinged bagging cone.

New Uses For Dithane

Rohm & Haas Co., Philadelphia, has reported that a number of new uses have been found for its "Dithane" fungicide.

The material can be mixed with the soil to protect cotton seedlings against parasitic diseases. It also can be used on apples as late cover sprays in summer diseases control. The company claims it offers long protection for the fruit.

Fusiform Rust Booklet

Bulletin 304 of the Agricultural Experiment Station, Alabama Polytechnic Institute, Auburn, Ala, provides a comprehensive review of southern fusiform rust and the factors affecting its incidence in Alabama's coastal plain region.

A statistical study cited in the bulletin indicates that year of planting, species planted, stand age, height-over-age ratio, and number of trees per plot affected the number of rust infections per tree.

Southern fusiform rust causes long, spindle-shaped swellings on limbs and stems of slash, loblolly, and longleaf pines. In the last 20 years, the incidence of this rust has greatly increased and has become a factor to be considered when planting pines in the coastal plain.

Award To Niagara Canisters

The Niagara Garden Products newly designed canisters were recently awarded a Certificate of Merit at the Third Package Design Awards Competition sponsored by the Package Designers Council in New York.

A division of the Food Machinery and Chemical Corp., Niagara reports an increase in sales since the advent of the new packages which are designed to create an appealing and coordinated display on dealers' shelves. The most effective features of the line are the combinations of colors and art work which attract the consumer's attention and, at the same time, convey with an illustration the purpose for which the product is used.



Demonstrate New Crop Plane

Demonstrator models of the new Transland AG-2 agricultural and forestry airplane will be available this summer at agricultural aviation centers overseas and in the United States as part of the sales and service program being introduced by Smith, Kirkpatrick & Co., New York, sales agents for the plane.

Built by the Transland Co., Torrance, Calif., the plane is currently being put through an extensive flight evaluation program. The AG-2 has already been utilized to fight forest fires and can carry a payload of more than 2,000 pounds.

Co-op Pest Control Guide

The Farm Chemical section of the Indiana Farm Bureau Co-operative Association, Indianapolis, has issued the 17th annual edition of their Pest Control Guide which contains recommendations and instructions for controlling over 400 pests.

Recommendations in the 32-page guide are sorted into 27 categories.

Boron Requirements Booklet

When the calcium supply in the soil is low, boron will increase its absorption and utilization. A high level of lime in the soil reduces boron absorption and may cause boron deficiency if the supply is at a critical level.

A continuous supply of boron is necessary because it is used and fixed in the plant and does not move to new growth areas as do nitrogen and magnesium.

The Agricultural Experiment Station of the Alabama Polytechnic Institute, Auburn, Ala., has issued Bulletin 305, compiled by John I. Wear, associate soil chemist, which presents results of investigations into the problem of boron requirements in Alabama crops.

Among the topics discussed in the booklet are: boron deficiency symptoms of plants, sources of boron for fertilizer use, experimental results with crops, tolerance of crops to boron, and residual effects of boron added to Alabama soils.

FOR DUST FORMULATORS ONLY

The leaf shown above is infested with aphids. These tiny sap-sucking insects seldom move more than a few inches a day. This sluggishness and their manner of feeding require the deposition of a contact insecticide on these hard-to-kill insects. Coverage of the entire plant surface is necessary for adequate control.

The characteristics of any dust reflect the quality of the diluent used. Most dusts have less than 20% toxicant; the remainder is an inert diluent with which the toxicant must be in intimate contact for maximum effectiveness.

PYRAX ABB, the most compatible diluent with workable bulk density, imparts flow and anti-caking properties to dust mixes. PYRAX ABB promotes electrostatic dispersion of the dust cloud, assuring coverage of the entire plant surface.

Please send Bulletin 23D Sample PYRAX ABB NAME POSITION (please write on or affect to company lafterhead)

Tailor Made Fertilizers

Sudbury Laboratory, Sudbury, Mass., has placed on the marked units of nitrogen, phosphorus, and potash which can be mixed by the purchaser to make any desired grade of fertilizer.

Aimed at gardeners, the idea stemmed from the wide use of Sudbury's soil kits which indicated plant food deficiencies in the soil and recommended the proper fertilizer grade, which rarely coincided with the standard formulations.

Gustafson Chem-Soil Mixer

The Gustafson Manufacturing Co., Inc., Corpus Christi, Tex., has developed a fungicide applicator which is mounted on a planter and treats the seed, the bottom of the seed bed, and all the soil that covers the seed during the planting operation.

Named the Chem-Soil Mixer, the unit is available in two models. The FMO mixer mounts on listerplanters without seed imbedding wheels and the FMK mixer mounts on planters with seed imbedding wheels.

THE MAN WITH THE



MULTIWALL PLAN



UNION
PACKAGING SPECIALIST
DON DEININGER

saves
Multiwall
user
*8 per M
through
specifications
review

A Chemical Company, already using 43 different

sizes and types of Multiwalls, planned to add new products to its line. Union Packaging Specialist Don Deininger recommended a simplification of Multiwall specifications and inventory. Union prepared a Specifications Manual for the manufacturer, also simplified, unified and modernized his bag designs.

Results: user reported: (1) Union's recommendations for re-designing bag sizes and constructions in some instances saved as much as \$8 per M. (2) The new Specifications book enabled the cust-

omer to order bags more easily and accurately. It also simplified his inventory control.

(3) The new designs established a visual relationship between his family of products, enabled his sales force to do a better merchandising job.

This is a typical example of Union's 5-Point Multiwall Plan

in action. Perhaps it can produce gains in your own Multiwall packaging operation. Write for additional information.

Union Multiwall Recommendations are based on this 5-point Packaging Efficiency Plan

• DESIGN
• EQUIPMENT

- CONSTRUCTION
- SPECIFICATION CONTROL
- PLANT SURVEY

Better Multiwall performance through better



UNION'S PACKAGE ENGINEERING DEPARTMENT will study your Multiwall bagging methods and equipment and make appropriate recommendations, regardless of the brand of Multiwalls you are now using.

UNION MULTIWALL BAGS

INION BAG - CAMP PAPER CORPORATION

233 BROADWAY, NEW YORK 7, N. Y.

New Mixed Isomers Bulletin

A new, four-page, technical bulletin on Primary Amyl Alcohol (mixed isomers) has recently been released by Carbide and Carbon Chemicals Co., a division of Union Carbide and Carbon Corp., New York, Physical properties, specifications, shipping data, uses, and physiological properties are discussed.

Primary amyl alcohol consists of approximately 60 per cent pentanol-1, 25-35 per cent 2-methyl butanol-1, and five per cent 3-methyl butanol-1.

Its surface-active properties make it effective as a spreading agent to permit better flow of oil emulsions of insecticidal formulations. It is also useful in preparing the herbicidal esters of 2,4-D and 2,4,5-T acids.

Potts Fitting Catalog

A catalog describing the Speedline Fittings manufactured by the Horace T. Potts Co., Philadelphia, illustrated with photographs and diagrams of corrosion-resistant fittings is available from the company.

Sturtevant Micronizer Plant

Sturtevant Mill Company, Boston, has announced that a Micronizer pilot plant is now in operation, where four fluid energy mills will handle experimental and custom fine grinding and classification to sizes ranging from 20 microns to smaller than one micron. The capacity of the units, which depends upon the size of the mill and the kind of material ground, ranges from a halfpound to a ton or more an hour. Experimental grinding will be offered at the cost of set-up and labor. Custom grinding bids will be offered upon request.

In the new plant, three of the Micronizers will use compressed air, the fourth steam. The units in operation reflect changes in the Micronizer made by Sturtevant over the past few years. They are the same units recently exhibited by Sturtevant at the Nuclear Congress in Philadelphia.

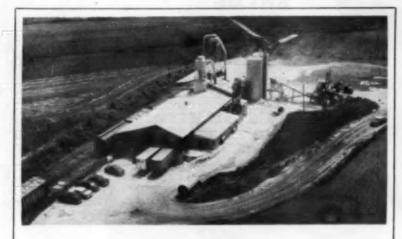
Enameled Parts Booklet

A 20 - page cartoon - illustrated booklet offered by the Erie Ceramic Arts Co., Erie, Pa., deals with the origin and development of porcelain enameling, its advantages, and unique features. The company designs and fabricates small porcelain enameled parts such as meter dials and instruction plates, and special applications such as oil seal shoes.

Du Pont News Letter

The Agricultural News Letter, issued by the Public Relations Department of E. I. Du Pont de Nemour & Co., Wilmington, Del., contains information regarding new developments of interest to agriculture based on laboratory and field investigations by the company.

Among the items in the publication is a discussion of the crop uses of the substituted urea herbicides by Florian J. Otto. At the present time two substituted urea herbicides, monuron and diuron, are being offered for commercial use. A third, neburon, is being carefully evaluated by Du Pont. A fourth, fenuron, is also being investigated by research people, primarily for control of brush and noxious weeds.



New Modern Plant Where SER-X is Produced

SER-X is a potassium hydrous alumina silicate of the following analysis: SiO2 73.08%, Al2O3 13.70%, Fe2O3 3.12%, TiO2 0.54%, CaO 0.30%, MgO 1.14%, NaO 0.22%, K2O 5.42%, Ign. Loss 2.54%, Fusion Point Cone 12.

Processed from Sericite ore, SER-X has an average particle size of 3.5 microns and a bulk density of 40 pounds per cubic foot, SER-X is inert, non-hydroscopic and non-shrinking. The particles are flat. Because of these physical and chemical properties it has proved ideal as a diluent in the formulation of agricultural insecticide dusts.

For Technical Literature and Samples, Write Dept. AC 1



The Test Proven Insecticide Diluent Formulators Report **Excellent Results**

MMIT MINING CORPORA

BASHORE BUILDING

CARLISLE, PENNSYLVANIA



10,000 hours . . . only \$700 repair costs

Work record of first Michigan Tractor Shovel important since today's Michigans have same basic power train design

When the first Michigan Model 75A Tractor Shovel rolled out of Clark's Benton Harbor (Michigan) plant in 1954, company engineers knew it was good. But who could expect it to put in 10,000 working hours on a tough job . . . and still be "good enough to last many, many more years," (according to the satisfied owners, Indiana Farm Bureau's Indianapolis fertilizer plant). Five months a year, their "old" 11/4-yard Michigan Tractor Shovel operates on a three-shift basis-moving an average of 60,000 pounds of superphosphate and other materials per hour from storage piles to mixing units. It also handles mixed fertilizer, cleans spillage, and pushes freight cars.

Still has original tires, axles

In service equivalent to 5 years' normal 8-hour-a-day use, replacement parts have cost only \$700, according to Lewis Risinger, Master Mechanic. "And," he says, "we've never broken an axle, or replaced a tire, which is unusual in our operation. I need only three socket

wrenches to take the whole power-train apart—it's a fast, simple job that sure cuts downtime."

Operator praises power shift transmission

"Tve noticed," says Plant Supt., Melvin Leach, "that whenever there's a choice, operators always pick the Michigan. Even a new man learns to operate it in a hurry." Operator Bob Jefferson especially likes the "power shift and steer, the bucket action, and the fact you don't have to 'grind' gears and wheels to keep close to the pile."

Liked the first – bought four more

Since he authorized purchase of this first Michigan Tractor Shovel, Ben Scharrer, head of the Bureau's Fertilizer Division, has bought four more Michigans for Bureau plants in Indianapolis and Jefferson, Indiana. "One of the things I've been pleased to see," says Mr. Scharrer, "is that there have been no changes in the basic Michigan design. Except for natural wear, the first

Michigan is as up-to-date as machines coming off the line today!"



6000th MICHIGAN NOW ON THE JOB

Michigan Tractor Shovel No. 6,000—produced a little over two years after the first one—is now at work for Ohio Gravel Co., Cincinnati. It has the same all-Clark "flywheel to drive-wheel" power train as do the first and all other Michigan Tractor Shovels.

Michigan is a registered trade-mark of

CLARK EQUIPMENT COMPANY

Construction Machinery Division 2463 Pipestone Road Benton Harbor 18, Michigan

In Canada: Canadian Clark, Ltd., St. Thomas, Ontario

CLARK EQUIPMENT

News Brevities

THE AGRICULTURAL SALES DE-PARTMENT of the United States Borax & Chemical Corp., Los Angeles, has moved its north central district office from Kansas City to Chicago.

AC

THE DELAWARE VALLEY CHEMICAL CORP. is planning to construct a liquid fertilizer plant at Swedesboro, N. J. The new plant will manufacture nitrogen solution and complete neutral mixed fertilizers.

AC

JOHN G. MAC DERMONT, assistant general manager of Monsanto Chemical Co.'s overseas division, died last month in a Kansas City hospital of acute pancreatitis. He was 43 years old.

AC

DAVID R. BREIEN has been elected vice president — comptroller of the Lummus Co., New York. Also elected at the same time were M. J. Marchione, as treasurer, and C. Frank Corbin, assistant secretary.

AC

J. J. BROENING has joined the staff of the American Bio-Chemical Laboratory, Baltimore, and is in charge of the Industrial Testing Service division.

AC

THE INTERNATIONAL CONFERENCE ON SYSTEMIC PESTICIDES, originally scheduled to be held Oct. 16 to 18, 1957, has been cancelled because of insufficient funds.

AC

TEXAS GULF SULPHUR Co., New York, has announced the retirement of Holland R. Wemple as vice president of the company.

AC

WILLIAM E. WEEMS has been appointed manager of technical service for the phosphates department of American Cyanamid Co.'s Phosphates and Nitrogen division.

AC

THE CHEMICAL SPECIALTIES RE-SEARCH LABORATORIES, New York, has announced the availability of their 1957 catalog, listing reports on over 1500 trade-named chemical specialties.

LISTENING POST

(From Page 61)

Damage was moderate to severe in Moore County, N. C., with many fields in various counties needing immediate protection to save the first cutting. Virginia, Maryland, and Delaware, in the east, also reported activity. In the western part of the country spraying was necessary for the pest in Utah. Egg laying was heavy in untreated alfalfa fields of Washoe County, Nev., and adults were reported from Ada, Canyon and Owyhee Counties, Idaho. The clover leaf weevil was reported from Oklahoma, Missouri, Illinois, Indiana, Virginia, Maryland and Pennsylvania. Reports on greenbug have shown light infestations generally in the winter wheat area; however, 1,000 acres were treated in San Saba County. Tex

Potato Psyllid Populations High

A SURVEY recently conducted for
potato psyllid on wild host
plants in the spring-breeding areas of

west Texas, southern New Mexico, south central Arizona and southeast California showed very high populations, particularly in regions east of the Rocky Mountains. Population at Big Spring, Tex., averaged 516 psyllids per 100 sweeps, which is the largest ever recorded for the area. The same was true for the San Angelo, Texas area with an average population of 184. These high populations indicate the likelihood of large northward movement during May and June into the potato and tomato growing areas of Colorado, Utah, Wyoming and Nebraska, if favorable weather occurs at migration time.**

EDITORIAL

(From Page 31)

in the growing season to know what infestations may be, the general tone of the market is strong. Basic manufacturers as well as formulators share the feeling that if they can't make money in pesticides they might as well

Colloidal Products Corporation

announces

X-77

Another important contribution to the field of Spray Adjuvants.

Recent experiment station releases indicate increased effectiveness when Colloidal X-77 is used with systemic herbicides such as amino triazole, Dalapon, 2,4-D and 2,4,5-T.

For further information direct inquiries to:

COLLOIDAL PRODUCTS CORPORATION

established 1920

100 Gate Five Road

Sausalito, California



For greater yields, fewer complaints stress early production of cotton!

Toxaphene Is the Keystone of a Successful Cotton Insect Control Program In Any Area

Cutworms, thrips, fleahoppers, overwintered boll weevils—ignored by many cotton farmers—can take the profit out of a crop early in the season, leaving the way open for hard-to-control infestations that may get out of hand later in the year.

Experts stress the value of early cotton production. They say a crop that matures early is money in the bank, leaves the farmer free to concentrate on a "bonus" from a profitable top crop. *Toxaphene*

is the indispensable insecticide—the keystone—for a well-planned insect control program because it kills all major cotton insect pests, helps keep fields free of infestations that can develop into real trouble in July and August.

Farmers who follow a toxaphene program become repeat toxaphene customers—and for good reason! Toxaphene-treated fields produce consistently high yields year after year. Successful cotton growers tell us they make toxaphene the keystone of their insect control program.

NX57-2

TOXAPHENE

. . a product of Agricultural Chemicals Division

HERCULES POWDER COMPANY

970 Market Street, Wilmington 99, Delaware





in MAGNESIA for AGRICULTURE

EMJEO (80/82% Magnesium Sulphate) Calcined Brucite (fertilizer grade) 65% MgO

POTNIT

(95% Nitrate of Potash)
for
Special Mixtures and Soluble
Fertilizers
Other Fertilizer Materials

Insecticides - Fungicides

Mercury Compounds for Agricultural Use

DITHIOCARBAMATES

FERRIC - ZINC

EXPORT-IMPORT

BERKSHIRE CHEMICALS, INC.

420 LEXINGTON AVE. • NEW YORK 17
55 New Montgomery St. • San Francisco 5, Cal.

Innis Speiden Company Division
New York • Philadelphia • Bostom • Cleveland
Chicasan

get out of the market. And this is their year of decision.

Manufacturers of emulsifiers, diluents, toxicants, etc., report that supplies are being ordered out at an encouraging rate in preparation for what could be a big year. Most encouraging factor is the apparent break in the drought which has paralyzed agriculture in some sections of the southwest for the past ten years. With an adequate water supply this season, the market for cotton pesticides could again be a big one.

WASHINGTON REPORT

(From Page 55)

A number of years ago, it was this reporter's opportunity to record a series of special radio broadcasts direct from an observation plane during a pioneer gypsy moth control project in the state of Connecticut, where the Connecticut Agricultural Experiment Station and the Federal Government cooperated. A daredevil exnavy pilot was flying the spray plane, and when his plane began to plunge into the side of the mountain, seemingly unable to shake off a terrific downdraft, I forgot all about the radio program and my pilot and I "talked him up." We were rewarded by seeing the plane barely skim the top of a mountain range and struggle toward the landing strip with a ten foot section of oak in the landing gear. Since the "mike was open," the resulting broadcast was exceptionally well received, and thousands of people were introduced to the subject of aerial control of gypsy moth.

Why does a farmer buy fertilizer and how can he be convinced that it's a profitable investment to buy and use more? These are among the questions in a national survey being made by the National Plant Food Institute as a preliminary step in expanding the fertilizer market.

How to increase the market for any commodity is the \$64 question. Yet there is a pot of gold at the end of this rainbow in terms of further increased efficiency of farm production, and greater utilization of industry's capacity to produce, which now exceeds the actual consumption of plant food by 25% to 50%.

The fertilizer industry appears to be moving, and Washington observers feel moving in the right direction.

The capability of the fertilizer industry to compete during the height of a selling season, such as now in progress, was the key point in testimony by John D. Conner, General Counsel for the National Plant Food Institute, in recent Washington hearings on the legislation proposed in the controversial new Senate bill, \$11.

As Mr. Conner puts it Able Company and Baker Company are locked in keen competition for business with Able supplying fertilizer from a plant in Alabama, and Baker operating a plant in Arkansas. Able has an advantage over Baker on inbound freight on phosphate. Baker has a similar advantage on potash. Each will have some advantage in the territory adjacent to their plants. The intermediate point at which their relative advantages counteract each other will vary for each of the different grades of fertilizer sold. It will be much different for one consisting predominantly of phosphate, and for one consisting predominantly of potash. Both Able and Baker must be prepared to make reductions for each of their various grades in the zone of competitive impact.

At present, the Institute believes that existing laws permit manufacturers to compete in good faith, and to meet price competition of competitors. Under the proposed legislation \$11, a manufacturer caught in such a situation apparently would have to meet it by a general reduction on all sales of that same commodity. Insofar as the fertilizer industry is concerned, this would be an economic impossibility in some instances, and a practical impossibility in others.

"To the extent to which it could be done it would impose a rigid system of pricing upon the industry which, in our opinion, would deprive farmers, in some instances, and the fertilizer manufacturer in others, the benefits from a more flexible competitive system," the Institute statement added.

Senator Estes Kefauver (D-Tenn.), Subcommittee Chairman, probably will be hearing lots more on this measure before the "boiling point" is reached. Printed copies of the transcript of the completed hearings are being studied far and wide you'll be hearing more on this measure in the days ahead.

Most of the farm land being bought is to enlarge present holdings, and fewer city investors are in the farm real estate market. These are some of the latest findings from the U. S. Department of Agriculture's continuing review of the farm real estate market, based on reports from 7,000 dealers, bankers, and government field men. Despite the fall off in city money, land prices are continuing to climb at a steady clip, with more gains in prospect.

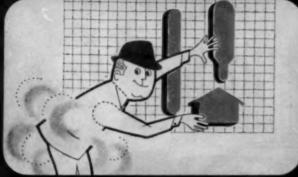
Rule of thumb figure to keep in mind is that farm land values are about 50% above the end of World War II, with a 4% increase racked up last year.

Farm chemical manufacturers might well note that farmers apparently do realize the great need to increase the efficiency of their operations, inasmuch as nearly half of all the farms bought last year were to enlarge the farm operation, compared with only 40% bought for this purpose a year ago, and only 25% of the purchases in this category in 1950. Farmers believe they need more land to spread overhead and cut costs. The U. S. Department of Agriculture found that sellers financed 37% of farm purchases, commercial banks 19%, insurance companies 18%, and federal land banks 10%. Seller financing was far the most predominant west of the corn belt.*



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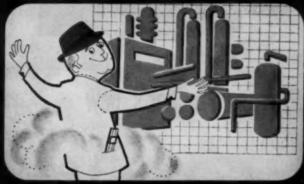




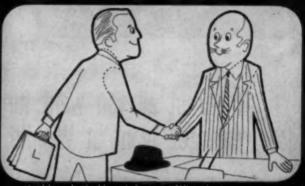
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TABLE 45 Cucumber Spray Tests at Virginia For Mildews and Anthracnose Control (55)

Fungicide	Lbs./100 g	Control Rating	Yield Rating	Exper. Pref.	
Manzate	1.5	1	L	1	
Dithane Z-78	2	3	3	2	
1 appl. Orthocide 50W then					
Dithane Z-78	2 and 8	2	2	2	
Dithane Z-78 + Tribasic					
Copper Sulfate	2 + 4	3	5	4	
Dithane Z-78 + Tribasic					
Copper Sulfate	1 + 2	3 .	4	4	
Orthocide 50W + Tribasic					
Copper Sulfate	2 + 3	6	7	6	
Orthocide 50W	3	6	6	7	
Tribasic Copper Sulfate	4 .	10	9	8	
Thylate	2	9	8	9	
G-27810	2	11	10	10	
HL 877	3 & 2*	6	11	11	
Control	0	12	12	12	

*Reduced to 2 lb. after plant injury.

Foliar Sprays (5-day interval) and the Development of Specified Diseases On Great Lakes Lettuce in Florida (9)

Material	Lbs./100 g	Downy Mildew Severity 0-11	Rhizoctonia Bottom Rot Severity 0-11	Jelly butt (No. heads diseased)
Check		3.2	4.8	22
Agristrep	100 ppm	3.0	3.0	14
Manzate	11/2 lbs.	0.2	3.5	12
Parzate	2	0.5	3.5	17
Tribasic copper S	2	2.2	2.8	13
D-14 + ZnSO,	23/4	0.8	2.5	8
Orthocide 50-W	-/4	2.0	3.2	12
Fermate	2	2.0	2.8	14
Terraclor	2	3.8	1.5	7
Spergon	2	2.8	2.2	12

TABLE 47-49

Partial Control of Bottom Rot and Grey Mold Rot of Head Lettuce From Spraying in New York (27)

Trial	Materials	Rate	% Diseased at Harvest
1-G	Terraclor 75 — 1 'spray	20 lbs. in 200 gpa	1
	" 20 — 1 dust	100 lbs. pa	13
	Iron Vancide 70 - spray	3 lbs. in 200 gpa	14
	" " 20 — dust	150 lbs.	14
-	Control		29
2-C	Terraclor — 2 sprays	2.5 lbs. in 50 g	34
-	Iron Vancide - 2 sprays	1.5 lbs. in 50 g	37
	Control		64
3-B	Terraclor — 2 sprays	2.5 lbs. in 50 g	0
	Iron Vancide	1.5 lbs. in 50 g	0
	Control		8

TABLE 50

Sweet Spanish Onion Leaf Blight Control From Eight Applications at Five Day Intervals (25)

Materials	Rate	Mean Lf. Score	Wgt. in % Over Ck.	Exp. Pref.
Check		2.25		
Griseofulvin	250 ppm	3.50*	2	
Vancide	2 lbs.	4.25**	-3	
captan	21/2 lbs.	3.75**	15*	
Manzate	2 lbs.	5.00**	34**	1
Dithane D-14	2 gts. + ZnSO ₆	5.62**	28**	2
Cu ₂ O	3 lbs.	6.37**	23**	2
Kemate (Dyrene)	2 lbs.	8.25**	27**	1

Lf. score LSD .96-1.26 (5%-1%)

FUNGICIDE TESTS

(From Page 47)

found no one material equally good against all. Manzate, Parzate, and Dithane scored highest for downy mildew. Terraclor was the most effective against Rhizoctonia and bacterial jelly butt, with Dithane in second place. Terraclor caused moderate injury, spergon and D-14 + ZnSO₄ slight. (Table 46.)

BOTTOM ROT AND GREY MOLD

Bottom rot and grey mold control experiments were conducted in New York on muckland comparing sprays of Terraclor with iron Vancide in one, two, and three applications, while lettuce was young: and Terraclor with captan, and Puratized, mixed with the fertilizer. All results in rather inadequate control. Other materials tried with no more success included Crag 6428 and a Puritized phenyl mercury lactate, applied to the soil surface and disced in before sowing. Of eight experiments only three gave any encouragement that chemicals applied to the soil so early in the life of the plant can protect lettuce six or eight weeks later against either Rhizoctonia or Botrytis. Further work with crop sprays of Vancide and Terraclor may be warranted if more water is employed per application. Best three of aix sets of data are given in Table 47. (27.)

Onions

ALTERNARIA LEAF BLIGHTS
In replicated feld plots sprayed with power sprayer at Ithaca, New York, seven materials were compared. All plots innoculated with fresh spore suspension resulting in severe uniform infection which killed the sixteen check plots three weeks before those sprayed with the better fungicides such as Kemate, Manzate, cuprous oxide, and Dithane. Materials thought not worth further trial are Griseofulvin, iron vancide, and captan. (Table 50.)

Pepper and Tomato

BACTERIAL SPOT

This disease was controlled best in Florida seed beds by five applications of Tribasic copper + Agristrep, with Agristrep alone in second place on pepper and streptomycin sulfate on tomato. Spraying was done at five day intervals by Sowell, who recommends Copper + Agristrep for grower use. (Table 51.)

Pepper

BACTERIAL SPOT

In garden plots heavily infected at Knoxville, Tennessee, Felix reports that good control was obtained with six applications of Agrimycin spray 1400 ppm if made at three or four day intervals, although the disease never quite disappeared. Weekly intervals were unsatisfactory even at 2800 ppm. (51.)

Pepper

Agrimycin alone, Copper A, and combinations of these two were applied twenty times (10) in Florida between September 26 and January 6, at 20 gallons to 100 gal. per acre, with good results; particularly from the two combined at 100 ppm + 4 lbs. respectively. No phytotoxic effects. (Table 52.)

TABLE 51
Control of Bacterial Spot of Pepper and Tomato at Bradenton, Florida (12)

		Cor	itrol		Safety	Exp. Pref.		
Fungicide	Conc.	Pep.	Tom.	Во	oth	Pep.	Tom.	
Tribasic Copper	4 lbs./100 g	6	6	2	8	4	3	
Copper A	4 lbs./100 g.	7	5	2	S	4	3	
Tribasic +	4 lbs. +							
Agristrep	100 ppm	3	1	2	S	1	1	
Agristrep	200 ppm	2	. 5	1	S	2	4	
Tribasic Copper* + Agristrep	4 lbs. + 400 ppm then 100 ppm	1	2	2	5	. 2	1	
Strep. sulf. +	too bhu		-	-				
glycerine	100 ppm + 1%	5	4	3	T	3	9	
Strep. sulf. alone	100 ppm	4	3	1	S	3	2	
No treatment		8	6			3	6	

^{*}After second application, Agristrep conc. dropped to 100 ppm.

TABLE 52 Control of Bacterial Spot of Pepper in Florida (10).

Pungicide	Rate	Control	Yield	Exp. Pref
Agrimycin + Copper A	200 ppm + 4 lbs. 100 ppm	1 (8)	1	3
	+ 4 lbs.	2 (S)	2	1
Copper A	4 lbs.	3	3	2
Agrimycin	400 ppm	4	4	6
8.0	200 ppm	. 5	5	4
66 :	100 ppm	6	6	5

TABLE 53

Control of Southern Blight of Peppers with PCNB in Setting

Water in Alabama (2).

		Plants Killed				
		Control	+ PCNB			
I Chilton	July 10	16.6	4.1			
19	Aug. 1	40.2	9.9			
64	Sept. 13	69.4	34.1			
II N. Ala.						
Hort. Sta.	Sept. 14	14.4	7.0			

TABLE 55
Tomato Early Blight Control With Dusts in Virginia (54)

Fungicide	Conc.	Lbs./acre/appl.	Tons/acre	Exp. Pref.
Tribasic cu.	7% .	125	27.8	1
Copper-Mn	7-2%	125	25.9	1 or 2
Cop-O-Zinc	7-2%	126	25.4	2 or 3
Tennam	5%	. 122	25.0	3
captan (Stauf).	7.5%	110	24.9	3
captan (Cal S)	7.5%	115	24.7	3
Manzate	4.9%	131	24.0	3
Check	-	-	23.5	

TABLE 56
Control of Tomato Early Blight and Grey Leaf Spot in South Carolina (48)

Materials	Rate	In Order of Yield
Manzate spray	4X conc. (6 lb.)	1
Manzate	4.2% dust	2-3
Tribasic Copper spray	1X (3 lbs.)	2-3
Tribasic Copper	-6% dust	4
Tennam spray	2 lbs.	5
Dithane Z78	4.2% dust	6-7
Manzate spray	1X (1.5 lbs.)	6-7
Tribasic spray	4X. (12 lbs.)	8
Dithane M-22	4.2% Maneb dust	9
Control	_	10

SOUTHERN BLIGHT (S. rolfsii)

Field trials in Alabama during 1953, 1954, and 1955 by Diener and Carlton, with several materials resulted in eliminating all but PCNB which consistently gave significant control especially with tomatoes and peppers. Severe disease in 1956 resulted in clear cut advantages from using four pounds in the setting water on three dates of planting, at two locations. There were five replications and a minimum of fifty plants on each plot. (Table 53.)

Sweet Corn

HELMINTHOSPORIUM LEAF BLIGHT

Several sprays, twice a week, gave considerable degree of control of Helminthosporium turcicum in Florida, the best ones being Dithane D-14, Manzate, and Dithane M-22. (Table 54.)

TABLE 54
Twice Weekly Foliar Sprays and the Development of Helminthosporium Turcicum on Sweet Corn in Florida (9).

Materials	Lbs. in 100 gals.	Disease Severity ⁴ 4/21/56
Check	-	4.8
Z - 78	2	2.4
44	3	2.4
Parzate	2	1.8
64	3	2.3
Dithane M-22	11/2	1.5
0.6	2	1.1
Manzate	11/2	1.4
00	2	1.1
D-14 + ZnSO ₄	2 qts3/4 lb.	1.4
" + MnSO	2 qts1 lb.	1.1

^{*}On a scale of 0 to 11.

Sweet Corn

LEAF BLIGHT (H. turcicum)

In a series of field plots sprayed five times at weekly intervals by Darbey in Florida, satisfactory control was obtained with maneb and a one to one mixture of maneb + ferbam but not when only three applications at two week intervals were made. Nabam and maneb are recommended for grower use. (11.)

Tomato

EARLY BLIGHT

In a comparison of six dusts applied seven times to replicated field plots at Blacksburg, Virginia by Wingard, Henderson and Spasoff, defoliation and yields in dicated that the copper, and copper-manganese fungicides were the best against early blight. While all fungicides gave better yields than the checks, Tribasic was significantly better than all others except copper-manganese. It is concluded that copper is best for holding back early blight. (Table 55.)

EARLY BLIGHT AND GREY LEAF SPOT

In replicated field plots innoculated with both fungi after the first application, all materials in Tables 56 gave satisfactory control without phytotoxic effects at Charleston, South Carolina. Five weekly applications were made by Epps between May 1 and June 1 with power equipment. Sprays were slightly superior to

TABLE 4.

Effect of post-emergence application of triazine compounds on plant growth

	Chlorazin, 2 lbs.	Chlorezin, 4 lbs.	Chlorazin, 8 lbs.	Simazin, 2 lbs.	Simaxin, 4 lbs.	Simazin, 8 lbs.	G-27901, 2 lbs.	G-27901, 4 lbs.	G-27901, 8 lbs.	Propazin, 2 lbs.	Proposin, 4 lbs.	Propozin, 8 lbs.	G-30031, 2 lbs.	G-30031, 4 lbs.	Check
Corn	>9	>9	<10	10	10	10	9	10	<10	>10	>7	>8	10	11	10
Oats	>6	>2	0	0	0	0	<4	0	0	2	0	0	0	0	10
Soybeans	2	0	0	0	0	0	2	0	0	>2	0	0	0	0	10
Wheat	<2	0	0	0	0	0	0	0	0	0	0	0	0	0	10
Snapbeans	5	<2	0	<3	0	0	<7	0	0	< 3	0	0	0	0	10
Alfalfa	>7	0	0	3	0	0	0	0	0	<6	0	0	0	0	10
Lima Beans	1	0	0	0	0	0	0	0	0	0	0	0	0	0	10
Clover	6	0	0	0	0	0	0	0	0	>2	0	0	0	0	10
Cotton	<8	<7	<8	>2	>5	>5	6	>6	>3	6	<5	>4	7	7	10
Peas	10	<6	8	4	<9	4	>6	>7	0	7	0	>2	0	0	10
Spinach	4	0	0	0	0	0	0	0	0	0	0	0	0	0	10
Onions	0	0	0	0	0	0	0	0	- 0	0	0	0	0	0	10
Carrots	>8	>5	>2	0	0	0	4	4	0	<8	<2	>2	>2	<1	10
Rye Grass	<9	<3	0	0	0	0	0	0	0	0	0	0	0	0	10
Cucumbers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10

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LISTENING POST

(From Page 58)

cides was encountered in the tests. Other data indicate a similar variation. While the stand increases given by certain fungicides were unusually high (up to 100 per cent) in certain instances, the stands were sometimes rather light. Such variation is to be expected on the basis of the factors influencing the severity of rice seedling blight, as mentioned above. The results obtained confirm other reports as to the superiority of the mercury fungicides for combating Helminthosporium.

The stand increases given by Agrox, Ceresan M and M-2X, Panogen 15, and MEMA varied from outstanding to marked improvement. Certain of the non-mercurials, such as Arasan SFX, Delsan AD, and Phygon-XL gave consistent stand increases.

Some of the materials tested have been recommended for seed treatment of rice, including Arasan, Phygon-XL, Ceresan M, Yellow Cuprocide, Spergon-SL, and Dow 9B.

SIMAZIN

(From Page 36)

experimental chemicals were utilized as in the previously mentioned preemergence test. However, G-30031 Date of planting—July 30, 1956.
Date of application—August 22, 1966.
Date of rating crop tolerance—Sept 29, 1956.
Rating Scalo—10—no effect; 0—dead.

was used only at the 2 lower dosage rates of 2 and 4 pounds per acre because of an insufficient amount of the chemical, and the ½ and 1 pound

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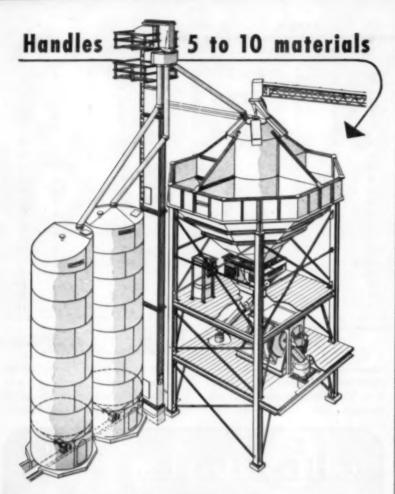
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dosage rates of Simazin were not applied.

The various crop seeds were planted July 30, herbicides applied as an overall broadcast spray on August 22, and weed control and crop ratings obtained September 29. The post-emergence information cannot be considered as final, because the test was conducted in an area where a different test was performed a few weeks previously, and there were indications of residual action exhibited by some of the chemicals utilized in the previous test. The data can be regarded only as a guide for future tests.

Weed control and crop selectivity ratings were obtained 5 weeks after application of the herbicides, and results shown in Tables 3 and 4. As far as weed control is concerned, G-30031, at 2 and 4 pounds per acre, yielded 72% and 92% weed control. The remaining compounds gave weed control varying between 50% and 87% at the various dosage rates. In our tests, Simazin has exhibited little activity when applied postemergence to weeds, other than through root contact.

In regard to selectivity in the post-emergence test, none of the experimental compounds were injurious to corn. Geigy 444E possessed the highest degree of selectivity, although weed control was inferior to that obtained with some of the other triazine compounds. In addition to corn, the test indicated that G-30028 may be utilized as a post-emergence spray on such crops as carrots, peas, and cotton. G-27901 performed satisfactorily on snapbeans, cotton, and peas. G-30031, at the 2 and 4 pounds dosage rates, injured all crops except cotton and corn.

Summarizing, Simazin appears to be outstanding as a pre-emergence application for weed control in corn; in addition, the compound has shown indications of satisfactory use in other crops such as tomatoes, potatoes, asparagus, and grapes. Its use as a soil sterilant also should be explored more fully. A method of analysis for determining residues is available; residue analysis in corn is now being

performed. A rather ample supply of Simazin will be available for test purposes during 1957, formulated as a 50% wettable powder and also in a pelletized form.

Preliminary results with related compounds indicate that several such herbicides may be useful on different crops. Experimental samples of G-27901, G-30028, G-30031, and Geigy 444E will be available for experimental use and evaluation during 1957.*

APPLE MILDEW

(From Page 42)

overwinters and from which the mildew causing fungus will spread unless protective fungicides are applied in each of five or six sprays from delayed dormant through the third cover.

The cost, per pound, of Karathane and Mildex was higher than growers have been paying for other fungicides and this slowed down their use. Also, these materials, especially when combined with Triton B 1956, in some cases injured fruit finish. Many growers are now using sulfur in the first few sprays and then combining Karathane or Mildex with organic fungicides in the first to third cover sprays, when high temperatures make sulfur unsafe.

In 1956 Systox plus lead arsenate when used in the petal fall and first cover sprays apparently checked mildew on apples as well as, or even better, than the other fungicides. The use of Systox plus lead, after the latter part of June, had little effect on mildew since few new leaves were being formed. Tests conducted on roses, where new leaves form until frost, showed that Systox, 12 ounces per 100 gallons plus lead arsenate, 2 pounds per 100 gallons, at weekly intervals, held mildew to only a leaf or two throughout the season. Wettable sulfur applied at the same times to other blocks held mildew only to about 7.4% infected leaves. The possibility of using Systox-lead arsenate on apples deserves further research since the use of the combination apparently causes less injury than the use of sulfur or Karathane or Mildex. Further phosphate insecticides are not recommended by the manufacturers for use with Karathane but the use of Systox-lead provides a phosphate insecticide that can be used with little chance of injury to fruit and foliage in the petal fall spray.

Factors Favoring Outbreaks

UTBREAKS of many plant diseases occur in cycles from a few to many years. To enable a fungus to enter the severe or destructive part of the cycle the causal fungus must be present; next, plenty of plants in a very susceptible stage must be present; the weather must favor dissemination of the fungus; the fungus must be capable of attacking the crop and spreading until it reaches a destructive stage. Further, the fungus must develop in such a manner that control measures do not readily prevent or eradicate the disease.

The following factors enabled powdery mildew to become destructive in eastern United States in 1953-1955

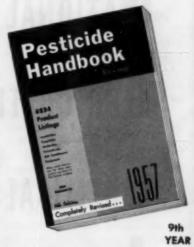
The general use of organic fungicides

1—If sulfur instead of organic fungicides had been generally used, the last mildew outbreak, like that in the late twenties, would have occurred but the loss would have been far less. Sulfur would have reduced the early build up and spread of the mildew-causing fungus but the use of sulfur or Karathane or Mildex would not have prevented all the overwintering of mildew in the buds and its subsequent spread from leaf to leaf.

2—The weather, in the eastern United States, preceding and during the 1954-1956 outbreak of powdery mildew was unusually favorable to mildew. A series of warm winters enabled the fungus-causing mildew to have a high percentage of survival within the apple buds. The unusually long periods of low rainfall during June and July in many parts of Pennsylvania in 1953-1954-1955 favored the build up and spread of powdery mildew.

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Association Building 1145 19th Street, N. W. WASHINGTON 6, D. C. may, as indicated in mildew control work on roses, have removed a partial chemical deterrent to mildew.

4—Vigorous growth of apple foliage apparently made it more susceptible to mildew than it was in the twenties through the fourties. As Woodward states, "probably the season itself only indirectly influences the disease, whose incidence is directly controlled by the vigor of the host plant. Tender tissue of high water content is very susceptible to attack and whenever seasons or cultural practices bring about these conditions the disease is encouraged."

The use of organic fungicides and the marked increase in the amount of fertilizer applied per tree, the last few years, enabled trees to produce much more foliage, that was more tender than before, and enabled the trees to produce new leaves later into the summer than previously.

Judging from past history the present outbreak of powdery mildew in eastern United States should decrease with cyclic changes of the weather. When mildew is present, growers should apply sulfur or Karathane or Mildex in a regular schedule to prevent spread from leaf to leaf and subsequent infection of newly developing buds.

REFERENCES

 Fisher, D. F.—Control of Apple Powdery Mildew, U.S.D.A. — Farmers' Bul. 1120—Revised, 1-10; 1928.

 Woodward, R. C.—Studies on Podosphaera leucotricha; 1 — Mode of Perrennation. Trans. Britain Mycol. Soc. XII—173-204; 1927.

FERTILIZER VIEWS

(From Page 50)

Coast Experiment Station. Dr. Geraldson worked on the familiar blossom-end rot disease which has ruined many a tomato crop. Commercial growers as well as home gardeners have reason to be grateful for the new discovery.

Up until Dr. Geraldson's report, it has been believed that blossom end rot was caused by excessive moisture. But moisture is, according to this

latest discovery, of only secondary importance. He has shown that this disease is a symptom of hidden hunger. Lack of available calcium is the direct cause.

Most virgin soils in certain sections of Florida lack sufficient available calcium to maintain crop growth. The liming materials commonly applied do not supply sufficient soluble calcium to meet the tomato crop requirements and thereby prevent blossom-end rot. Dr.Geraldson suggests spraying the plants during their peak growth period with a suspension of lime at the rate of 4 pounds of calcium in 100 gallons of water within 24 to 48 hours after a rain.

Functions of Calcium

Plants build calcium into the walls of their cells to form a sort of selective sieve through which nutrients are allowed to enter the cell itself. Calcium also serves as a cement to hold cells together and to neutralize certain acid residues resulting from cell metabolism. This

physiological function of calcium is one phase of its essentiality: the other is its soil amendment role to correct soil acidity which in turn helps soil microbes to hasten the decomposition of organic matter and generally improve the physical condition of the soil.

By Product Calcium Sulfate

In this connection Florida's byproduct calcium sulfate may be cited.

Producers of triple superphosphate in Florida have a serious disposal problem in the vast accumulations of by-product calcium sulfate associated with their processing. Research by Florida soil scientists has revealed that many soils of the State are deficient in sulfur and now apparently also in soluble calcium. Perhaps in time an economical way may be found to utilize those huge mounds of calcium sulfate in the local agriculture. Both the calcium and the sulfur of this by-product "gypsum" could be used locally if it were possible to process the material so it



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could be bought at competitive prices. Scientists at the Tennessee Valley Authority are working on this processing problem, which is admittedly difficult. Some feasible way of utilizing this local resource will be found by some ingenious researcher.

Caution

One advantage of using gypsum in place of ordinary limestone as a source of calcium is that it does not change the soil solution reaction. In this respect it behaves like calcium silicate. Unless lime, particularly in its active forms, is used with caution, it is possible to repress the availability of soil trace elements, iron, manganese, zinc, copper and boron. Plant growth can be hurt badly by injudicious applications of calcium and magnesium carbonates. Soil tests should be relied upon to determine the correct amounts to apply in each situation.

G. L. F. STORY

(From Page 33)

drab kraft-brown bags to brightly colored bags, containers, and cartons labeled "Groleaf" for the home market. These received an impressive response, especially from the lawn and garden trade. In the fiscal report for the year ending last June 30, the division estimated that the new campaign was bringing as much as a 50% increase in sales of organic and inorganic chemicals to the "home" market.

In areas where suburban home development has substantially reduced farm acreage (as in Metropolitan New York, Long Island, Newark, and Buffalo) soil building manager Mr. Crissey estimates that sales to the home owner have more than offset the loss of sales to farmers. He points to the G.L.F. farm outlet in Hicksville, New York as being typical of this trend.

"Hukville (New York) feed sales have fallen off from approximately 8000 tons per year to about 2000, but increases in sales of fertilizers, pesticides, and home garden equipment have more than offset these losses in feed," he declared. Since G.L.F.'s tri-state area lies in a large

area affected by the postwar shift to the suburbs, success of the current campaign will be watched closely by G. L. F. planners, and possibly by the major chemical firms faced with a shrinking farm market.

G.L.F. outlets in most areas anywhere near the larger cities are stocking not only fertilizers and pesticides for the home gardener, but also a variety of farm tools and small equipment; and roofing, fencing, and other hardware. This diversity of products is credited with bringing in many of the customers for the agricultural chemicals packages. In certain areas (like Little Falls, N. J.) the G.L.F. farm store has become a place where home owners, as well as the farmers who have survived the rush to the suburbs, go for advice as well as for agricultural supplies.

Queried about possible trends in G.L.F. agricultural chemicals sales he may have noticed, Mr. Crissey reported an increasing demand for higher analysis fertilizers. He also reported a big increase in grassland fertilization practices, attributing part of it to the Soil Bank and part to a growing appreciation of its values by the farmer.

Mr. Crissey predicts an upward trend in lime consumption, but said that special labor and production method problems with fertilizer pesticide mixtures may hold up their use for a good while. "There remains the consideration," he pointed out, "that production of such mixtures involves special training and practice in dealing with poisons—a weighty problem for the fertilizer mixer and dealer."

Even in organic fertilizers and such specialty items as goat and sheep manure, Mr. Crissey reports increased sales.

As to the question of whether the G.L.F. contemplates expanding to other states, Mr. Crissey was adamant. "There is no possibility of such expansion," he declared. "The present G.L.F. area is judged to be ideal in size and scope for its operations. The cooperative does not contemplate expansion into other areas."



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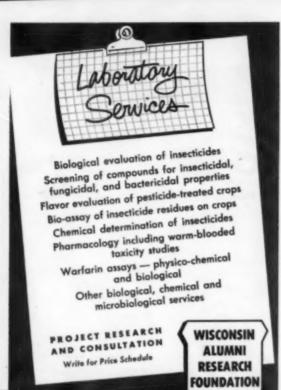
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DR. W. M. BEVER has been named head of the department of plant pathology, University of Illinois, Urbana, Ill. Dr. Bever has been at Urbana since 1940 working for the U. S. Department of Agriculture on cereal diseases. He was appointed to the university faculty in 1949.

AC

THE OHIO PESTICIDE INSTITUTE will hold its annual summer meeting at the Ohio agricultural experiment station at Wooster on Aug. 13 and 14.

EDITOR'S MAILBAG

(From Page 38)

visit he would be happy to have the opportunity of visiting U. S. companies in these lines who are interested in trade with Australia either by importation, or by manufacture under license.

We also intend to enter the field of veterinary products and would be interested in contacting companies who make these articles.

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From your March issue, will you kindly send me the feature article beginning on page 42. Could use it in my selling efforts.

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"Credit, Making a Profit, Finance, Highlight Discussion at NAC Convention in San Francisco," AGRICULTURAL CHEMI-CALS April, 1957.

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HEPTACHLOR IN ARGENTINA

(From Page 12)

Inspection of the areas treated with Heptachlor showed that grasshoppers were killed forty minutes after application, and the residual insecticide was still effective fifteen days after application. This, plus the fact that it was safe to pasture beef and dairy cattle only ten days after the Heptachlor application, made the program an outstanding success from all aspects.

As a result of the convincing success achieved with

Heptachlor in the grasshopper campaign, the Ministry of Agriculture has allocated test plots at the Balcarce Experiment Station in the province of Buenos Aires, and other experimental farms, for the study of Heptachlor as a soil insecticide. At the present time, recommendations are under consideration for control of wireworms, white grubs, Mediterranean and other fruit flies, and other insects. Government officials, landowners, and formulating companies are watching these experiments with interest. In them, they see the hope of widespread protection for crops grown in Argentina.



IMPORTANT NOTICE!

Final Advertising Deadline

for the June N.P.F. I. Convention Issue Will Be May 13th

Our June issue of AGRICULTURAL CHEMICALS will be distributed at the registration desk of the National Plant Food Institute Convention — to be held at the Greenbrier Hotel in White Sulphur Springs, West Virginia, June 9-12.

This is the one big fertilizer convention of the year — and AC will have many editorial features of particular interest to the fertilizer group.

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TALE ENDS

A NOTHER contribution to the drive to inform the general public of the need for agricultural chemicals to protect our food and fiber crops has been made this month by American Cyanamid Co. They have just completed at 27-minute movie, "Prelude to Plenty," which was previewed to the press in mid-April. Besides alerting the public to the widespread need for pesticidal aids to agriculture, a second purpose of the Cyanamid film is to convince Mr. and Mr. G. Public that agricultural chemicals are, and can be, used safely. The film focuses attention

on malathion as an insecticide with "an unusually broad range of usefulness, high insect boxicity and extremely low toxicity to man and animals."

We continue to notice an everchanging pattern in sales of fertilizers, pesticides, garden tools, seeds and bulbs to the suburban home gardener. Twenty years ago, in the New York area at least, the bulk of these sales were made from retail shops situated downtown, around the ferry houses and subway entrances. A commuter rushing for the 5:45 on a spring afternoon. "without" his unwieldly, brown paper package, was conspicuous. Now, much of this trade has switched to the suburbs. The discount houses, the supermarket, the roadside gardening emporiums are doing the business. More on this later.

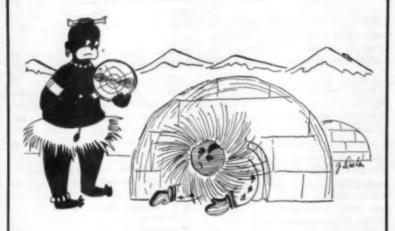
The press was quick to point out a few weeks back that the chief executive. President Eisenhower, himself, puttered around a garden supply shop in Chambersburg, Pa., for 45 minutes one early April afternoon, like millions of other suburban gardeners. It was one of the president's rare visits to any kind of a store. He usually avoids them because of the crowds such visits attract, but he couldn't resist the lure of spring, and the seed catalogs. P. S. He spent about \$5.00 on green bean and pea seeds, and for insecticides for use on his rose bushes.

Gibberellic acid has been getting a heavy portion of the free publicity that is always accorded any interesting new horticultural specialty. On NBC's TV show, "Today," an interesting test experiment was started early in April on two lima bean plants. Periodically one of the plants receives an application of G.A., while the second plant serves as a control. Viewers follow the progress of the two bean plants daily. And who do they have in the white coat, filling the role of experiment station technician? None other than KoKoMo Jr., accomplished chimpanzee associate of Dave Garroway.

A fertilizer manufacturer in Cologne. Germany tangled with the internationally known cometic firm, Ferd. Mulhens, recently over the right to employ the famous number, 4711, in its advertising and publicity. The fertilizer firm, Karl Koelsch, had obtained 4711 as its phone number, and insisted on using it, giant size, on its manure wagons and in newspaper advertising. The court ruled that while Koelsch could keep the phone number, they would not be permitted to flaunt it for publicity purposes.

Plans to spray millions of agres of forest land this spring in New York, New Jersey and Pennsylvania to control gypsy moth are being greeted with considerable hostility by anglers in the areas affected. One militant group around Roscoe, N. Y., the Beaverkill-Willowemoc Rod & Gun Club, fought hard to head off the spray program. Unsuccessful, they now plan a series of fish surveys and counts of insects on stream bottoms. The club will anchor filter paper in stream bottoms for analysis after the area is sprayed. Having loudly proclaimed in advance of any samples being analyzed their assurance that spraying with DDT is harmful to fish and insect life, regardless of concentration, we have the feeling that their survey cannot avoid being something less than purely scien-

Sales Resistance . . . Break It Down with Advertising



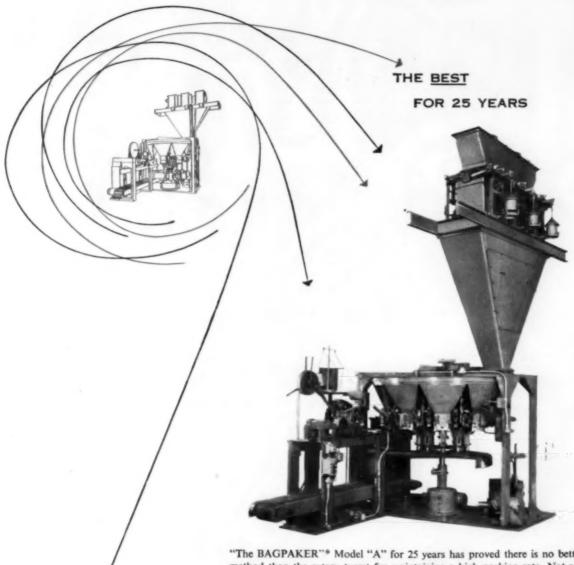
YES, you can help break down even the toughest sales resistance with a regular month after month sales message in a magazine that is read by your potential customers. The top magazine to reach your customers in the agricultural chemical field is, of course,

AGRICULTURAL CHEMICALS

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NOW WITH IMPROVED DESIGN

"THE BAGPAKER"*
IP'S NEW, Model "AF"

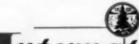
"The BAGPAKER"* Model "A" for 25 years has proved there is no better method than the rotary turret for maintaining a high packing rate. Not one Model "A" Bag Packing Machine installed by us has ever been replaced by another design.

Now this proven machine has been modified and simplified, incorporating all the improvements indicated desirable in 25 years of unrivalled successful operation.

"THE BAGPAKER" NEW MODEL"AF" FEATURES:

- New Simple Design—for free-flowing or semi-free-flowing feeds, fertilizers, etc.
- Simplified Operation and Maintenance.
- Automatic sewing reduces bag size—cuts cost.
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- LOWER COST.

*TRADEMARK



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SAFETY SAFETY

Miller Bill Rules Out Harmful Residues In the Control of Truck Crop Insects

Today harmful insecticidal residues on garden and truck crops are strictly taboo. Yet under recent federal legislation, popularly known as the Miller Bill, technical piperonyl butoxide and pyrethrins are among the few toxic agents to receive official exemptions from tolerances.

That's because their toxicity, for all practical purposes, is limited to insects. In combination these two active ingredients form the versatile, time-tested Pyrenone* concentrates.

When used according to directions, Pyrenone formulations may be used on growing crops right up to the time of harvest. They not only leave no harmful residues — but they

have no effect on the taste or flavor of treated foodstuffs.

Other exemptions with respect to growing crops include rotenone... combinations of piperonyl butoxide, pyrethrins and rotenone... combinations of piperonyl cyclonene and pyrethrins... and combinations of piperonyl cyclonene, pyrethrins and rotenone. All of these compounds are compatible with sulfur, basic copper sulfate and many commonly used fungicides.

To avoid penalties under the Miller Bill, dust garden and truck crops with one or more of the pesticides listed above. Or simply use Pyrenone — and play safe from harvest to market!

*Reg. U. S. Pot. Off., FMC.





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